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REVIEW
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VOL. XXXIII JUNE 1954

LING (L.). **Taxonomic notes on Asiatic smuts.—II.**—*Sydowia*, 4, 1–6, pp. 74–81, 1 fig., 1950.

Five new species and three new combinations are included in the present contribution to the author's current series of studies on Asiatic collections of the Ustilaginales in European and North American herbaria [cf. *R.A.M.*, 31, p. 147].

SINGER (R.). **New and interesting species of Basidiomycetes III.**—*Sydowia*, 4, 1–6, pp. 130–157, 1950.

The genera forming the subject of these critical studies are *Conocybe*, *Pholiotina*, *Alnicola*, and *Naucoria*. Incidentally, the existence of ectotrophic mycorrhiza on native South American trees was demonstrated for the first time in Tucumán and Catamarca, Argentina, where the most common and important mycorrhizal fungus is probably *Alnicola diplocystis* n.sp. on alder (*Alnus jorullensis* var. *spachii*).

JANKE (A.). **Zur Systematik der Spross- und Schimmelpilze.** [On the taxonomy of the yeasts and moulds.]—*Sydowia*, 4, 1–6, pp. 44–52, 1950.

The taxonomic relationships of the genera *Aspergillus*, *Penicillium*, *Mycoderma*, and *Kloeckerospora* are used to illustrate the author's thesis that even where the perfect state of a fungus is known, its imperfect state should be designated by a specific name among the Fungi Imperfecti.

The differences between the modes of origin of conidia and oidia are explained and the justification for regarding the latter as a specialized type of the former is questioned.

The formation of a pseudomycelium in yeasts is apparently caused by inhibition of cell division during the progress of plasma development and is brought into prominence by adverse environmental conditions, especially a supra- or infra-optimal redox potential [cf. *R.A.M.*, 23, p. 177]. This is evidently also the reason for the strong tendency to biological dissociation in the form genus *Candida*. Great care should be exercised, therefore, in the use of pseudomycelium formation in taxonomy.

MÜLLER (E.). **Die schweizerischen Arten der Gattung Leptosphaeria und ihrer Verwandten.** [The Swiss species of the genus *Leptosphaeria* and its relatives.]—*Sydowia*, 4, 1–6, pp. 185–319, 40 figs., 1 graph, 1950.

The author's exhaustive critical studies on the Swiss representatives of *Leptosphaeria* [cf. *R.A.M.*, 31, p. 402; 32, p. 246], including *Wettsteinia* [31, p. 354], led to the establishment of 14 new species and the application of new names to five existing species.

Potlaichuk (V. I.). Род **Nigrospora Zimm.**, его видовой состав и систематическое положение. [The genus *Nigrospora* Zimm., the composition and classification of its species.]—Микробиология [*Microbiology, Moscow*], 21, 2, pp. 219–225, 2 figs., 1952.

Ten species of the genus *Nigrospora* [cf. *R.A.M.*, 6, p. 757], the features of which are described and the synonymy listed, were studied at the Pan-Soviet Scientific Research Institute for Plant Protection, Leningrad, U.S.S.R. The colour and size of the conidia and their arrangement on the conidiophores change according to the conditions of nutrition. The black or almost black colour of the spores and the hyaline mycelium are the most constant characters, indicating that the genus *Nigrospora* should be considered as belonging to the Mucedineae and not Dematiaceae, in which it is usually placed. Species of the genus can lead either a parasitic or a saprophytic existence. *Basisporium gallarum* is transferred to *Nigrospora*, and Molliard's original species is distributed amongst three species of *Nigrospora*.

Arx (J. A. v.). **Über die Ascusform von Cladosporium herbarum (Pers.) Link.** [On the ascus form of *Cladosporium herbarum* (Pers.) Link.]—*Sydowia*, 4, 1–6, pp. 320–324, 1950. [English summary.]

A species of *Mycosphaerella* isolated from overwintered onion inflorescences agreed with the published descriptions of *M. tulasnei* and was also morphologically identical with the type species of the genus, *M. tassiana* [*R.A.M.*, 29, p. 122]. The former must therefore be added to the already numerous synonyms of the latter. Ascospore cultures of *M. tassiana* from onion, chives, *Medicago falcata*, and other hosts gave rise to conidia typical of *Cladosporium herbarum* [33, p. 116], thereby demonstrating the genetic connexion between these two.

Other species discussed are *Mycosphaerella macrospora* (= *Didymellina macrospora*) [22, p. 179; 25, p. 185] and *M. iridis* (= *D. iridis*) [8, p. 382] both on iris; *M. dianthi* on carnation [25, p. 185]; and *M. aronici* Volk., the ascigerous state of *Passalora aronici* n.comb. (*Ramularia aronici* Fuck.) on *Doronicum* spp. and other Compositae.

Saksena (S. B.). **A new genus of the Mucorales.**—*Mycologia*, 45, 3, pp. 426–436, 50 figs., 1953.

A detailed description is given of a new mucoraceous fungus isolated from a forest soil in India and named *Saksenaea vasiformis* n.gen., n.sp. The distinctive sporangia, arising from a rhizoidal complex, are shortly stalked, flask-shaped, and have a well-formed columella; the spores are released by the dissolution of a mucilaginous plug at the apex of the neck; only the sporangial stage was encountered.

Wehmeyer (L. E.). **Studies in the genus Pleospora. V.**—*Mycologia*, 45, 3, pp. 391–414, 18 figs., 1953.

This contribution to the present series [*R.A.M.*, 32, p. 343] deals with the relationships of species of *Pleospora* [33, p. 262] possessing spores with more than five transverse septa and a leptospheroid or asymmetric septation. Annotated descriptions are given of 15 species, of which six are new, one new combination, and one new state.

Hughes (S. J.). **Studies on micro-fungi. XIII. Beltrania, Ceratocladium, Diplorhinotrichum and Hansfordiella (gen. nov.).**—*Mycol. Pap. Commonw. mycol. Inst.* 47, 15 pp., 10 figs., 1951.

In this further contribution to the taxonomy of the Hyphomycetes [cf. *R.A.M.*, 31, p. 147 and next abstract], four species of *Beltrania* (one new), one of *Ceratocladium*, two of *Diplorhinotrichum* (one new), and three of *Hansfordiella* n.gen.

(one new and two new combinations) are described. Species of the new genus are parasitic on species of *Asterina* and *Meliola*.

Hughes (S. J.). **Studies on micro-fungi. XIV. Stigmella, Stigmina, Camptomeris, Polythrincium, and Fusicladiella.**—*Mycol. Pap. Commonw. mycol. Inst.* 49, 25 pp., 15 figs., 1952.

Species of four genera of the Hyphomycetes are redescribed and illustrated [cf. preceding abstract]. Included are *Stigmina platani* forming black spots on the leaves of *Platanus orientalis* from Greece, Italy, Cyprus, India, and Oklahoma, *S. platani-racemosae* n.comb. (syn. *Stigmella platani-racemosae*) on *P. racemosa* in California, *Stigmina palmivora* n.comb. (syn. *Exosporium palmivorum*) causing leaf spot of palms (*Phoenix reclinata* in S. Rhodesia, Kenya, and Gold Coast, *P. canariensis* in Austria, and *Borassus aethiopum* [*B. flabellifer* var. *aethiopicus*] in Sierra Leone), *Camptomeris albizziae* (syn. *Helminthosporium albizziae*, *Heterosporium albizziae*, and *Stigmina verruculosa*) on living leaves of *Acacia mollissima* [*A. decurrens* var. *mollis*] in South Africa, and *C. leucaenae* on *Leucaena glauca* from Venezuela and Dominica. *C. tephrosiae* [see next abstract] is considered to be not a *Camptomeris*. The conidia-bearing cells of *Polythrincium* [*Cymadothea*] *trifolii* appear to be generally similar to those of *Camptomeris*. The type species of *Stigmella*, *S. dryina*, is a pycnidial fungus with phaeodictyospores, but as *Dicoccum dryophyllum* is the earliest name for this fungus, a new combination, *S. dryophyllum*, is proposed.

Bessey (E. A.). **Notes on the genus Camptomeris, Fungi Imperfecti.**—*Mycologia*, 45, 3, pp. 364–390, 34 figs., 1953.

The genus *Camptomeris* [see preceding abstract] is redescribed, with a key to the recognized species. Eight species, including *C. albizziae*, *C. verruculosa* n.comb. (syn. *Stigmina verruculosa*), *C. leucaenae*, *C. albizzicola* n.comb. (syn. *Helminthosporium albizzicola*) [*R.A.M.*, 33, p. 320], and two new species are described; four are excluded, among them *C. tephrosiae* [loc. cit.; 23, p. 410].

Van der Knaap (W. P.). **Blisterblight resistentie van Theeclonen.** [Blister blight resistance of Tea clones.]—*Bergcultures*, 22, 9, pp. 177–179, 6 figs., 1953.

A brief discussion is given of the possibilities of developing resistance to blister blight (*Exobasidium vexans*) of tea in Java [see following abstracts] by clone selection, (*a*) in existing clones, (*b*) of mother tea bushes on the basis of their capacity for resistance [*R.A.M.*, 32, p. 514], and (*c*) for parental material, individual nursery plants remaining healthy under epiphytotic conditions induced by artificial infection.

Laoh (J. P.) & Homburg (K.). **Blister-blight waarnemingen en bestrijdingsproeven in het Patuha'se.** [Blister blight observations and control experiments in Patuha region.]—*Bergcultures*, 22, 16, pp. 327–335, 337, 339, 341, 343, 345, 5 figs., 1 diag., 2 graphs, 1953. [English and Indonesian summaries.]

At Sperata-Sinumbra, a tea estate covering about 3,500 acres in a region of West Java with extraordinarily favourable conditions for the development of blister blight (*Exobasidium vexans*) [see preceding and next abstracts], very satisfactory control was obtained in 1952 by the application at five- to seven-day intervals of locally manufactured dusts with a copper concentration of 2 to 4 per cent. at a dosage of 10 to 12 kg. per ha., using a Whirlwind motor duster. On estates where spraying and dusting operations are conducted on a large scale the pruning and plucking programme should be modified accordingly. As in South India, increased infestation by *Helopeltis* mites [*R.A.M.*, 31, p. 210] was observed on treated bushes.

HOMBURG (K.). **Een beschouwing over het klimaat i.v.m. de bestrijding van de Exobasidium vexans.** [A survey of the climate in relation to the control of *Exobasidium vexans*.]—*Bergcultures*, 22, 16, pp. 345–347, 349, 351, 353, 3 graphs, 1953. [English and Indonesian summaries.]

The great local variability of the climate is considered to be a decisive factor in the severity of blister blight of tea (*Exobasidium vexans*) in West Java [see preceding abstracts]. The intensity of sunshine and its occurrence in the morning hours are of the utmost importance, as direct sunlight has a lethal influence on the spores, rain and its distribution and cloud being less influential. The relative humidity, determined by the foregoing factors, serves as a general standard for weather conditions, with the necessary adjustments in relation to prevailing circumstances for individual estates. A day mean of or exceeding 80 per cent. relative humidity is critical for blister blight development. During the west monsoon control operations may be discontinued after a five-day period with a lower mean but should be resumed after another three-day period at the higher humidity level. [This paper and the two preceding it are reviewed by W. W. MAYNE in *Plant. Chron.*, 48, pp. 562–565, 1953.]

BEINHART (E. G.) & MORGAN (O. D.). **Preliminary study of sterilizing Tobacco stems against mosaic diseases.**—[*Mimeo. Publ.*] *U.S. Dep. Agric.* AIC–334, 6 pp., 1952. [Mimeographed.]

Since the decrease in the use of waste tobacco stems for the extraction of nicotine, the material has been widely used as a fertilizer and a conditioner in mixed fertilizers. It has been shown that used in this way mosaic-infected tobacco refuse may serve as a source of infection for the new crop [*R.A.M.*, 17, p. 560]. In this study tests showed that the virus in tobacco stems is inactivated by exposure to a temperature of 212° F. in a saturated atmosphere for 15 minutes or longer.

JOLY (M.). **Modifications des particules de virus de la mosaïque du Tabac en solution. Étude par la biréfringence d'écoulement. I. Action de divers agents physiques. II. Action de divers agents chimiques.** [Modifications of Tobacco mosaic virus particles in solution. A study by birefringence of flow. I. Action of various physical agents. II. Action of various chemical agents.]—*Biochim. biophys. Acta*, 8, 2, pp. 134–144, 245–256, 2 graphs, 1952. [English and German summaries.]

Studies at the Institut Pasteur, Paris [*R.A.M.*, 32, pp. 218, 699], demonstrated that the determination of the extinction angle of tobacco mosaic virus solutions at various velocity gradients gives the mean size of the particles and their polydispersity. This technique was used to study the effect of ageing, demixing, and various mechanical and heat treatments, and for the quantitative study of the interactions between the virus and sodium dodecylsulphate, potassium chloride, gelatin, gum arabic, and colchicine. A qualitative interpretation of the lateral aggregation of the particles, spontaneously or due to flow, is proposed.

VALLEAU (W. D.). **A programme for control of black shank based on a new conception of the life history of the fungus.**—*Bull. Ky agric. Exp. Sta.* 576, 24 pp., 4 figs., 1 map, 1951.

Information is summarized on the symptoms, economic importance, morphology, dissemination, and persistence in the soil of the fungus causing tobacco black shank (*Phytophthora parasitica* var. *nicotianae*) in Kentucky [*R.A.M.*, 32, p. 217; cf. 33, p. 119]. Control measures include removing infected plants on sight, drenching the soil with a solution of nabam (1 in 400), and sowing grass [31, p. 213] in the

autumn. Every farmer, whether in an affected area or not, should watch for any sign of the disease. It is stressed that successful control obtained in one year does not necessarily mean that the danger is past.

VALLEAU (W. D.). **False broomrape and leaf curl: two new Tobacco diseases in Kentucky.**—*Plant Dis. Reptr*, 37, 11, pp. 538–539, 3 figs., 1953. [Multilithed.]

A graft-transmissible leaf curl [cf. *R.A.M.*, 30, p. 391], observed on one or two tobacco plants in fields in several counties in Kentucky, has not previously been recorded in the United States [C.M.I. map No. 147]. It is, according to D. I. Mathrani, identical in appearance with tobacco leaf curl in India [*R.A.M.*, 28, p. 597].

FINLAY (K. W.). **Inheritance of spotted wilt resistance in the Tomato. II. Five genes controlling spotted wilt resistance in four Tomato types.**—*Aust. J. biol. Sci.*, 6, 2, pp. 153–163, 1953.

Experiments were made at the University of Western Australia, Nedlands, in which tomato species and varieties were tested with ten strains of tomato spotted wilt virus [*R.A.M.*, 33, p. 267] to determine the number and mode of inheritance of the genes controlling resistance. Each of the four resistant tomato types previously used was crossed with the susceptible Potentate and with each other. Ten shoots were removed from each F_1 and F_2 plant and rooted in separate clones; thus the genetically identical clones could be inoculated with the different virus strains. Complete immunity from all strains of the virus could not be obtained from any combination of the four tomato types used. Three independently inherited recessive genes (sw_2, sw_3, and sw_4) and two dominant ones (SW_1^a, SW_1^b) control resistance to the five groups of strains. Porter's strain of *Lycopersicon pimpinellifolium* possesses resistance to all known strains except TB_2, but one or more of the genes is linked to small fruit size. Rey de los Tempranos has a similar constitution but possesses SW_1^b instead of SW_1^a, has a larger fruit, and crosses readily with commercial varieties. Pearl Harbor is a useful source of SW_1^a. Manzana has little to recommend it as a parent. Because of its immunity under field conditions, *L. peruvianum* warrants further study as a parent for producing tomato varieties to combat spotted wilt.

Previous evidence of synergism of spotted wilt strains was substantiated by experimental results.

KRSTIĆ (M.). **Nekoliko novih i ređih fitopatoloških pojava u šumama i rasadnicima.** [Several new and rarer diseases encountered in forests and nurseries.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 12, pp. 49–51, 2 pl., 1952. [French summary.]

A list is given of several new diseases observed on forest trees in Yugoslavia [*R.A.M.*, 30, p. 549; 33, p. 189] during a three months' survey from April to June, 1952. In Slovenia a wilt of chestnut trees caused by *Melanconis modonia* [cf. 16, p. 845], associated with symptoms resembling those of ink disease caused by *Phytophthora cambivora* [30, p. 549], was present in a mixed forest near Hotemež; *Adelopus* [*Phaeocryptopus*] *gaeumanni* was detected on Douglas fir [*Pseudotsuga taxifolia*] var. *viridis* [cf. 32, p. 410], *Gibberella baccata* on one *Robinia* tree, and *Puccinia coronata* on *Rhamnus frangula* [cf. 31, p. 430], the last two near Gorica. In Serbia were found *Fusarium scirpi* var. *caudatum* on lime (*Tilia parvifolia*) in a nursery at Valjevo and *Schizophyllum commune* [cf. 33, p. 189] on *Cercis siliquastrum* in Topčider Park, near Belgrade. Other records were: *Gymnosporangium clavariiforme* on *Juniperus communis* [cf. 31, p. 478] at Deliblatska Peščara and *Mycosphaerella maculiformis* [cf. 31, p. 39] on birch leaves in the vicinity of Predejan.

Bretz (T. W.). **Sterile distilled water as a medium for the isolation of the Oak wilt fungus.**—*Plant Dis. Reptr*, 37, 12, pp. 630–631, 1953. [Multilithed.]

A simple and reliable technique for isolating the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara quercina*: *R.A.M.*, 33, p. 267 and following abstracts] is to place chips of infected wood in sterile distilled water. Growth of the fungus is more rapid than on most nutrient agar media, contamination is greatly reduced, percentage recovery is higher, isolations can be made from dry or old specimens, and the method appears to be satisfactory for sampling in the field.

Fergus (C. L.). **Compatibility types isolated from mycelial mats of the Oak wilt fungus.**—*Plant Dis. Reptr*, 37, 11, pp. 565–566, 1953. [Multilithed.]

Cross inoculation experiments in the Department of Botany, Pennsylvania State College, showed that 40 isolates from each of two mycelial mats of *Endoconidiophora fagacearum* [*Chalara quercina*: see preceding and following abstracts] were all of the same compatibility type, while the same was true of isolates from a single tree (80 isolates from twenty mats), six such trees being tested. This confirms previous findings that only very few infected trees contain both types of mycelium [*R.A.M.*, 32, p. 285; 33, p. 189].

Fergus (C. L.) & Yount (W. L.). **Scrub Oak susceptible to Oak wilt.**—*Plant Dis. Reptr*, 37, 11, p. 567, 1953. [Multilithed.]

Endoconidiophora fagacearum [*Chalara quercina*: see preceding and following abstracts] was isolated from wilting scrub oak (*Quercus ilicifolia*) in Bedford county, Pennsylvania, thus bringing the number of naturally infected oak species in the State to eight.

Jeffery (A. R.). **The relation of Oak wounds made during spring wood formation to transmission of Oak wilt.**—*Plant Dis. Reptr*, 37, 11, p. 568, 1953. [Multilithed.]

Investigations carried out in Pennsylvania in 1953 showed that wounds made in oak trees during the period of spring wood formation are of considerable importance in the primary spread of wilt (*Endoconidiophora fagacearum*) [*Chalara quercina*: *R.A.M.*, 32, p. 348; 33, p. 188, and preceding and next abstracts]. The type of wound does not matter so long as the cambium is exposed, though infections occurred mostly on or near the crests of bark ridges. Lightning injury probably contributes greatly to this process.

Barnett (H. L.). **A unisexual male culture of Chalara quercina.**—*Mycologia*, 45, 3, pp. 450–457, 3 figs., 1953.

In crosses between isolates of *Chalara quercina* [see preceding abstracts] from Minnesota and West Virginia, several isolates with pale mycelium failed to act as female. The compatibility factors separated independently of sex or colour of mycelium, but there appeared to be linkage between colour and sex.

Björkman (E.). **Om 'Granens gulspetssjuka' i plantskolor.** [On the 'yellow tip disease of Spruce' in nurseries.]—*Svenska Skogsvårdsfören. Tidskr.*, 51, 3, pp. 212–227, 1 col. pl., 1953. [English summary.]

The yellowing of the tips of spruce saplings, which has been observed in nurseries in central and south Sweden, mostly on arable land with high pH values, is followed in severe cases by browning and death of the plants. The condition is believed to be largely attributable to an unfavourable potassium–calcium ratio in the soil, high calcium apparently impeding the uptake of potassium. In mild cases the symptoms have been arrested by soil amendments with ammonium sulphate or sulphur, while

trees more severely affected have reacted favourably to applications of potassium sulphate.

Itô (K.), Shibukawa (K.), & Kobayashi (T.). **Etiological and pathological studies on the needle blight of Cryptomeria japonica. I. Morphology and pathogenicity of the fungi inhabiting the blighted needles.**—*Bull. For. Exp. Sta., Tokyo*, 52, pp. 79–152, 6 pl., 19 figs., 1952. [Japanese, with English summary.]

Needle blight of *Cryptomeria japonica* is widespread throughout Japan and there are often severe epidemics on seedlings. Of the fungi found to be pathogenic in inoculation experiments, those most commonly present on blighted needles are *Phoma cryptomeriae*, *Cercospora cryptomeriae*, *Pestalotia shiraiana*, and *Mycosphaerella cryptomeriae*. Less common but also believed to be pathogenic are *Phyllosticta japonica*, *P.* sp. α, *P.* sp. β, *Macrophoma sugi*, *M.* sp., *Sphaeropsis cryptomeriae*, *Stagonospora cryptomeriae*, *Hendersonia* sp., *Pestalotia cryptomeriicola*, *P. aomoriensis*, *C. cryptomeriicola*, *Wegelina cryptomeriae*, *Gnomoniella* (?) sp., *Physalospora cryptomeriae*, *Leptosphaeria* sp., *Leptosphaerulina japonica*, and *Mollisia cryptomeriae*. Detailed descriptions are given of all these species.

Phoma cryptomeriae, *Pestalotia shiraiana*, *Sphaeropsis cryptomeriae*, and *Mycosphaerella cryptomeriae* inhabit not only seedlings, but stocks, cuttings, and mature trees. *C. cryptomeriicola*, *Physalospora cryptomeriae*, *L. japonica*, and *Mollisia cryptomeriae* inhabit only trees. *C. cryptomeriae* severely attacks young trees, especially those one to four years old.

The results of the authors' studies did not support Hara's view that there may be a genetic relation between *Phoma cryptomeriae* and *C. cryptomeriae*; *L. japonica* is not the perfect state of *P. cryptomeriae* and no connexion exists between this species and *Physalospora cryptomeriae*.

Experimental inoculations of two-year-old seedlings demonstrated that *C. cryptomeriae* was highly virulent and *Phoma cryptomeriae* only weakly parasitic. *P. cryptomeriae*, *Mycosphaerella cryptomeriae*, *Pestalotia cryptomeriicola*, and *P. aomoriensis* enter the plant only through wounded leaves. *P. shiraiana*, *Macrophoma sugi*, and *Stagonospora cryptomeriae* attack wounded and very young, healthy needles, but do not cause much damage. It is concluded that the most important and the most highly pathogenic of all these fungi is *C. cryptomeriae*.

Fritz (Clara W.). **Brown stain and its effect on the strength of Pine poles.**—*For. Chron.*, 28, 3, pp. 3–8, 3 figs., 1952. [Received 1953.]

Most of this information on the dark brown stain in stored red pine [*Pinus resinosa*] and jack pine [*P. banksiana*] poles in Canada caused by *Cytospora* sp. has already been noticed from another source [*R.A.M.*, 32, p. 288]. Although the stain itself does not reduce the strength of the wood, it should serve as a warning of conditions favourable to the growth of other, possibly destructive fungi.

Beesley (J.). **A survey of the causes of service failure of crossarms throughout Australia. Inspection (1952) of recovered crossarms in South Australia. Inspection (1952) of recovered crossarms in Tasmania.**—*Progr. Rep. CSIRO For. Prod. Div. Sub-Proj. P. 2–2*, 5, 17 pp.; 6, 12 pp., 1953.

The first of these surveys covered the examination of 727 cross arms removed from service in South Australia [see next abstract] and showed that 30 per cent. failed from decay, and 44 per cent. from splitting. The more durable timbers tended to fail more from splitting and less from decay than the less durable ones. No correlation was seen between mean annual rainfall and the cause of failure.

In Tasmania 60 per cent. of 375 cross arms removed from service had been condemned from decay and 12 per cent. from splitting. In about 60 per cent. of the

decayed arms the deterioration was more severe between pairs of spindle holes or at bolt holes where chemical action was apparently mostly responsible.

Record of the Second Annual Convention of the British Wood Preserving Association, Cambridge, June 23rd–25th, 1952.—iv+192 pp., 7 pl., 2 figs., [? 1953].

In this report [cf. *R.A.M.*, 32, p. 49 and next abstract] G. M. Hunt (pp. 9–14) discusses in a general way the necessity for finding and testing more and better wood preservatives and utilizing more fully those already in existence. T. J. Price (pp. 37–41) emphasizes the desirability of starting preserving operations as soon as possible after felling, particularly with tropical hardwoods. The need for timber preservation in present-day building is discussed by K. J. Lindy (pp. 58–67) from the point of view of the architect. D. R. Carr (pp. 68–81) describes the current developments in New Zealand in the field of timber preservation [see next page; 32, p. 50] for light building construction.

The problems of rail sleeper preservation in Australia [loc. cit. and preceding abstract] are presented by N. Tamblyn (pp. 177–182). Of *Pinus radiata* sleepers installed in South Australia in 1936 those treated with creosote are in a definitely superior condition to those treated with salts, particularly in hot inland areas. The same is true of eucalyptus sleepers in Victoria. Mechanical protection is much more important than decay prevention and oils do this more satisfactorily. In the oil-treatment of sleepers of three species of eucalyptus [see next page] it was found that 1,000 lb. per sq. in. pressure by the full cell process with a cycle of $1\frac{1}{2}$ hours gives an increased absorption and adequate penetration of these timbers.

Record of the Third Annual Convention of the British Wood Preserving Association, Cambridge, June 24th–26th, 1953.—vii+155 pp., 2 pl., 5 figs., 1 diag., [? 1953].

In this report [cf. preceding abstract] N. A. Richardson (pp. 4–9) describes methods for the preparation of timber for preservative treatment, emphasizing the need for barking and seasoning logs as soon as possible after felling [loc. cit.]. The most efficient stacking methods are given and recommendations for treatments before and during preservation.

G. Becker (pp. 37–49) reviews research and development in wood preservation in Germany [*R.A.M.*, 32, p. 654 *et passim*] during the past 20 years, citing 116 references. The work is summarized under the headings of results of research and developments in the application of chemical preservation.

The value of surface treatments is emphasized by F. H. Hall (pp. 59–64), giving as an example that in 35 years' experience no dry rot [*Merulius lacrymans*: *R.A.M.*, 33, p. 62] has occurred in buildings where the wood has been surface treated with preservatives prior to erection. The wide application of surface treatments to outdoor woodwork as well as internal structures, where more expensive pressure treatments are not practicable, is not fully appreciated.

J. T. Cosgrove (pp. 72–83) discusses pressure creosoting and obtaining better results with old equipment. Wood structure, extractives, and permeability are dealt with by H. A. Cox and D. B. Irvin (pp. 94–103). The main problems of wood preservation in France [32, p. 51] are discussed by J. Benoit and C. Jacquiot (pp. 109–118). P. Cutbush (pp. 127–135) gives an account of the codes of practice in relation to treated timber [32, p. 599].

Annual Report of the Forest Research Institute (New Zealand Forest Service) for the year ended 31 March, 1953.—*For. Res. Notes, N.Z.*, 1, 6, 171 pp., 1953. [Mimeographed.]

In this report [cf. *R.A.M.*, 32, p. 51] it is noted that in a survey of 22-year-old exotic conifers in Rimu Forest, radiata pine [*Pinus radiata*] and Lawson's cypress [*Chamaecyparis lawsoniana*] were parasitized by *Armillaria mellea* [32, p. 52] only in

the most favourable areas for tree growth. In Kaingaroa Forest G. B. Rawlings and J. W. Gilmour (p. 124) did not observe any parasitic *A. mellea* on *P. radiata* [loc. cit.], but the fungus was present as a saprophyte on 27 stumps evenly distributed in the sample plot (16 sq. ch.). Of the 81 trees in the plot, 27 were undamaged. Trees of *C. lawsoniana* in a commercial nursery were attacked by *Monochaetia* ? *unicornis* [cf. 33, p. 191], as also was a *Cupressus macrocarpa* in Whaka Forest.

H. R. Orman, H. A. Smith, and D. R. Carr (p. 142) completed their studies on the relative efficiency of ten different chemicals in the prevention of sapstain in experimental stacks of green, block-stacked *P. radiata* boards [32, p. 52]. All treatments [loc. cit.] were better than no treatment.

Czaja (A. T.). **Bekämpfung der Schwammgefahr in Häusern.** [Control of fungus risk in houses.]—*Umschau*, 53, 17, pp. 517–518, 1 diag., 1953.

The increasingly acute problem of damage by fungi, including dry rot [*Merulius lacrymans*: *R.A.M.*, 33, p. 1], the brown cellar fungus [*Coniophora puteana*: loc. cit.], and the pore fungus [*Poria vaporaria*: loc. cit.; 32, p. 655], in German dwelling-houses is discussed from the architectural angle. Beam ceilings ('Balkendecke') are the most vulnerable structures, where infection almost invariably originates, and it is proposed that the materials commonly used as fillings, e.g., damp clay or ash, should be replaced by cement or concrete.

Baechler (R. H.). **Naval stores and derivatives as wood preservatives.**—*Sth. Lumberm.*, 183, 2297, pp. 160–162, 1951.

In studies at the Forest Products Laboratory, United States Department of Agriculture, Madison, Wisconsin, on the possibilities of utilizing surplus naval materials for wood preservation [*R.A.M.*, 32, p. 52; 33, p. 61] rosin [30, p. 206] and oleoresin were considered as the principal agents, useful additives to preservatives already in use, and the starting material for the synthesis of a highly toxic chemical that would give good results when dissolved in a cheap carrier in relatively low concentrations. Modification of the two substances at a small cost would increase their effectiveness.

In preliminary toxicity tests complexes prepared with mercury chloride, cupric chloride, zinc chloride, and cupric acetate in rosin amine D and its acetate, caprylate, caprate, chlorobenzoate, ortho-phenylphenolate, borate, and arsenate, and also several hydrolytic products of chlorinated rosin and oleoresin all gave sufficiently promising results to warrant further research and service tests.

Neubauer (L. W.) & Grah (R. F.). **Absorption rates of 'penta' by various species of wood.**—*Agric. Engng, St. Joseph, Mich.*, 34, 8, pp. 534–537, 544, 1 fig., 1 diag., 7 graphs, 1953.

At the University of California, Davis, absorption rates of pentachlorophenol [cf. *R.A.M.*, 33, p. 127] were found to vary widely among a number of the woods in current use for fence posts on ranches in the State. The sapwood of hardwoods (represented in these tests by *Tamarix* and *Eucalyptus* [see above, p. 328]) tends to absorb the preservative more rapidly than that of softwoods (except Monterey pine [*Pinus radiata*: loc. cit.]), Douglas fir [*Pseudotsuga taxifolia*], for instance, being particularly slow. Incising increased absorption by an average of about 1 lb. per cu. ft. in a week, but the depth of the cuts should be roughly adjusted to the diameter of the post in order to avoid serious weakening. End-coating generally reduces the amount of absorption until the shellac softens or dissolves after 20 or 30 hours. Absorption rate is uniformly high at first and then decreases in a parabolic manner. The absorption rate of many softwoods is so low as to necessitate a full week for adequate penetration.

Mackay (J. H. E.) & Friend (Janet N.). **The effectiveness of antibiotics against some bacterial plant pathogens.**—*Aust. J. biol. Sci.*, 6, 3, pp. 481–484, 1953.

Tests were made *in vitro* at the Division of Plant Industry, Canberra, with purified crystalline antibiotics to select those which might be of use as chemotherapeutants against the most important bacterial diseases of tomato, dwarf bean [*Phaseolus vulgaris*: cf. *R.A.M.*, 33, p. 210], and members of the genus *Brassica* in Australia. Of the six antibiotics tested, streptomycin and aureomycin were slightly more effective than terramycin and all three were more inhibitory than penicillin, bacitracin, and chloromycetin [chloramphenicol] against *Corynebacterium michiganense* [31, p. 480], *Xanthomonas vesicatoria* [loc. cit.], *X. phaseoli* [loc. cit.], *Pseudomonas syringae*, *P. medicaginis* var. [f.sp.] *phaseolicola* [32, p. 659], and *X. campestris*. To be useful as a means of control, any treatment should be capable of controlling all the pathogens of a single host at about the same concentration. Streptomycin at 0·5 μgm. per l. fulfils this condition for dwarf beans and aureomycin at the same concentration for tomatoes. *C. michiganense*, the only Gram-positive organism tested, was the most sensitive and the only one inhibited by all six antibiotics at the concentrations used.

Staruigina (Mme L. P.). **Bac. polymyxa** как возбудитель мягкой гнили. [*Bac. polymyxa* as the cause of soft rot.]—Микробиология [*Microbiology, Moscow*], 21, 1, pp. 52–59, 1952.

Studies at the Moscow Branch of the Institute of Agricultural Microbiology showed that *Bac*[*illus*] *polymyxa* [*R.A.M.*, 30, p. 595; 31, p. 362] can cause soft rot in vegetables but that the conditions necessary to render it pathogenic are much more limited than in the case of *Erw*[*inia*] *carotovora*. In a comparative study cultures of the two bacteria, Nos. 8523 and 495, respectively, were found to be very similar both morphologically and culturally, varying only in optimum temperature (35° to 40° and 25° to 30° C., respectively) and spore formation, which is very irregular in *B. polymyxa* and greatly influenced by cultural conditions. In greenhouse inoculation experiments on potato slices, cabbage stumps, and carrot roots *B. polymyxa* caused as much rotting as *E. carotovora* only at 35° [cf. 33, p. 18]. Fresh cultures of *B. polymyxa* on potato slices caused decay at 25° and 35°, while inoculation with its spores caused the decay at 35° only.

Wallen (V. R.). **Treatment of vegetable seed for improved emergence.**—*Plant Dis. Reptr*, 37, 12, pp. 620–622, 1953. [Multilithed.]

In further tests of vegetable seed treatments at the Division of Botany and Plant Pathology, Ottawa [cf. *R.A.M.*, 32, p. 600], on seed of low germinative capacity stored for varying periods, a significant increase in emergence of soybean and citron [watermelon] was obtained with all the treatments (arasan, merculine, mercusol, panogen, phygon, spergon, and vancide 51), and of squash, pumpkin, vegetable marrow, and cucumber with all except mercusol and vancide 51. Phygon and spergon gave significant increases of muskmelon; phygon, vancide 51, panogen, and arasan for maize; panogen and phygon for dill; panogen for parsley; phygon and vancide 51 for spinach and bush bean [*Phaseolus vulgaris*]; merculine, panogen, phygon, and vancide 51 for beet and Swiss chard; and vancide 51 for carrot. Emergence of asparagus, cabbage, onion, parsnip, radish, and tomato was not increased by any of the treatments. One variety only of each vegetable was used.

Conners (I. L.). **Turnip mosaic on Swedes in eastern Canada.**—*F.A.O. Pl. Prot. Bull.*, 1, 8, p. 117, 1953.

Isolates from swedes displaying mosaic symptoms from Quebec and Nova Scotia [*R.A.M.*, 32, p. 666] were compared with an isolate of turnip virus 1 [turnip mosaic

virus] from swedes in Ontario [31, p. 363]. As well as turnip mosaic virus, the Quebec material contained a strain of cucumber mosaic, and that from Nova Scotia an unidentified virus which attacked radish, causing large chlorotic lesions followed by a systemic chlorotic mottle, but did not infect tobacco.

Newhall (A. G.). **Chloropicrin aerosol treatment of compost piles.**—*Plant Dis. Reptr*, 37, 12, pp. 625–627, 1 fig., 1953. [Multilithed.]

Treatment of compost heaps with larvacide aerosol [*R.A.M.*, 31, p. 207] (a 1:1 mixture of chloropicrin and methyl chloride) at $1\frac{1}{2}$ lb. per cu. yd. of soil (1 lb. for some light soils) gave satisfactory control of damping-off (*Pythium* spp. in particular) of cucumber, pea, cauliflower, beet, tomato, and [chilli] pepper [cf. 28, p. 554] sown in the compost two weeks later in trials at the Department of Plant Pathology, New York State College of Agriculture, Cornell University, Ithaca.

Ghillini (C. A.). **Marciume radicale della Bietola Zuccherina provocato da Sclerotium rolfsii.** [Root rot of Sugar Beet caused by *Sclerotium rolfsii*.]—Reprinted from *Industr. saccar. ital.*, 45, 5–6, 8 pp., 6 figs., 1952. [English summary. Received November, 1953.]

A severe attack of sugar beet root rot (*Sclerotium rolfsii*) occurred on peaty soils in the Po Valley, Italy [*R.A.M.*, 29, p. 486], in July, 1949. The fungus also occurred on hemp, a new host record. The author advances the theory that the vesicular swellings at the tips of the advancing hyphae, Curzi's 'oidalee' (*Boll. Staz. Pat. veg., Roma*, 11, p. 293, 1931), may create an osmotic equilibrium between the substratum and the very young cells to which the oidalee adhere.

As other workers have secured control with alkaline fertilizers [*R.A.M.*, 21, p. 399; 33, p. 276] the author suggests the use of purified lime on peaty, organic, or highly acid soils.

Canova (A.). **Alcune virosi della Barbabietola.** [Some virus diseases of Beet.]—*Ital. agric.*, 90, 7, pp. 469–476, 1 col. pl., 4 figs., 1953.

Notes are given on the symptoms, distribution, transmission, and general characteristics of three viruses recently recorded on beets in Italy for the first time. Beet yellows virus [*R.A.M.*, 32, p. 528], which was observed in the field in Ravenna in spring, 1953, was transmitted to beets at the Plant Pathology Institute, University of Bologna, primarily by *Aphis fabae* and *Myzus persicae* [33, pp. 131, 133], and to some extent by *M. ascalonicus* and *Macrosiphum solanifolii* [*M. euphorbiae*]. Beet mosaic virus [cf. 33, p. 131] was transmitted by sap inoculation and by the above vectors to beet, spinach, and *Chenopodium*, the symptoms developing eight to ten days after inoculation. Vein yellowing [yellow net], which hitherto has been recorded only in the United States [32, p. 3] and Belgium [28, p. 202], was transmitted by *A. fabae*, *M. euphorbiae*, *Myzus persicae*, and *M. pseudosolani* [*Aulacorthum solani*] to beet and spinach.

Fukushi (T.), Shikata (E.), & Yoshitani (K.). **Sugar-Beet mosaic.**—*Mem. Fac. Agric. Hokkaido Univ.*, 1, 4, pp. 443–454, 1 pl., 1953. [Japanese, with English summary.]

A mosaic disease of sugar beet was observed for the first time in the seed beet plot in Sapporo, Japan, in the summer of 1949, and subsequently in several localities in Hokkaido. Transmission experiments established the virus nature of the disease, which on the basis of host range and other properties is considered to be identical with the European beet mosaic virus [see preceding abstract]. Vectors included *Aphis glycines*, *A. gossypii*, and *Rhopalosiphum pseudobrassicae*.

Armitage (H. M.). **The 1951 Beet leafhopper control programme and the 1952 outlook.**—*Spreckels Sug. Beet Bull.*, 16, 2, pp. 11, 16, 3 graphs, 1952.

Beet curly top virus was of only minor importance in California [*R.A.M.*, 31, p. 447; 33, p. 196] during 1951, and was expected to be so in 1952, largely owing to the emergency spraying in October, 1950 and 1951, of an extensive acreage of Russian thistle [*Salsola kali*] on open land between the agricultural areas in the San Joaquin Valley and the foothills to the west to reduce numbers of leafhoppers [*Eutettix tenella*]. The build up of the virus during the five years prior to 1951 and the marked decrease thereafter as the result of spraying is demonstrated graphically, based on the virus incidence in crops of tomatoes, which are highly susceptible and widely planted in the area. The curly top situation is similar in the Salinas Valley and influenced by the same factors. The cost of spray materials and their application in 1951 was reduced by using only 1 lb. DDT in 2 gals. diesel oil applied (by aeroplane) from a height of 25 ft. in 100 ft. swaths.

Using an egg parasite collected in the Mediterranean region, Dr. N. Frazier obtained excellent leafhopper control by liberating small colonies of the parasite in the Coalinga area, though it is impossible to obtain a 100 per cent. kill by this method.

Skolko (A. J.) & Groves (J. W.). **Seed-borne fungi of Peas.**—Abs. in *Proc. Canad. phytopath. Soc.*, 20, p. 23, 1953.

In the examination of pea seeds during the period 1939 to 1950, inclusive, at the Science Service Laboratory, Ottawa, 92 species of fungi were identified. Three pathogenic species of *Ascochyta* (*A. pisi*, [*A. pinodella*, and *Mycosphaerella pinodes*: *R.A.M.*, 29, p. 499; 30, p. 16]) are the most important, 51 per cent. of the 5,000 seed samples examined bearing these species, 18 per cent. having over 10 per cent. infection. Seed from Quebec and eastern Ontario was the most heavily infected, whereas that from Alberta and British Columbia was relatively lightly so. *A. pisi* [33, p. 274] was by far the most common of the three *A.* species found.

Muller (A. S.). **A foliar disease of legumes in Central America.**—*F.A.O. Pl. Prot. Bull.*, 1, 6, pp. 83–84, 1953.

The legume leaf spot caused by *Chaetoseptoria wellmanii* [*R.A.M.*, 32, p. 616] has spread in Central America and may become of major importance in bean-growing areas of North and South America. In 1950 and 1952 it was prevalent in Honduras, where it was found on cowpeas and beans (*Phaseolus coccineus*, *P. lunatus*, *P. mungo*, and *P. vulgaris*). During a period of prolonged wet weather in June, 1952, an entire planting was defoliated and lost. Collections were also made in Guatemala by F. J. Le Beau on *P. calcaratus*, *P. vulgaris*, pigeon pea, *Desmodium nicaraguensis*, and *Dolichos lablab*.

On *P. vulgaris* the leaf spots (no pod or stem infections have been reported) are orbicular, sometimes irregular, and have a thin border of varying shades of brown, the centre being dull brown to greyish-white, becoming papery and often falling out. A brown, indefinite area is often present outside the border. The spots average 10 mm. in diameter, five to ten occurring on one leaflet; if numerous they measure not more than 5 mm. but may coalesce.

On cowpea the whitish, papery spots have a reddish-brown border and are reddish below; they are not zonate.

Tims (E. C.). **Pink root of Shallot, Allium ascalonicum.**—*Plant Dis. Reptr*, 37, 11, pp. 533–537, 1 fig., 1953. [Multilithed.]

Most of the information given in this review of pink root (*Pyrenochaeta terrestris*) of shallot has already been noticed [*R.A.M.*, 12, p. 547; 29, p. 134]. A

variety resistant to the disease, selected at Louisiana State University, was unusually susceptible to yellow dwarf virus [27, p. 176], and when infected with it became more susceptible to pink root, the combination of both diseases killing many of the plants. Control measures are reviewed.

Skiles (R. L.). **Purple and brown blotch of Onions.**—*Phytopathology*, 43, 8, pp. 409–412, 1953.

The information in this paper from the Colorado A & M College on purple and brown blotch of onion (*Alternaria porri*, *A. tenuis*, and *A. tenuissima*), a limiting factor in Sweet Spanish onion production in the State, has been noticed from a shorter version from another source [*R.A.M.*, 30, p. 598].

Kahn (R. P.), Anderson (H. W.), Hepler (P. R.), & Linn (M. B.). **An investigation of Asparagus rust in Illinois. Its causal agent and its control.**—*Bull. Ill. agric. Exp. Sta.* 559, 56 pp., 5 figs., 3 diags., 1952.

Most of this information on asparagus rust (*Puccinia asparagi*) and its control in Illinois has already been noticed from other sources [*R.A.M.*, 32, p. 169]. Field observations indicate that spore dissemination is mainly by wind, rain contributing to the spread of the disease on individual plants.

MacNeill (B. H.). **A Botrytis rootrot condition in Lettuce.**—*Plant Dis. Reptr*, 37, 12, pp. 618–619, 2 figs., 1953. [Multilithed.]

A root rot of lettuce, believed to be caused by a strain of *Botrytis cinerea* [*R.A.M.*, 25, p. 150], was responsible for serious crop losses, amounting in some instances to more than 80 per cent., in the Bradford Marsh area, Ontario, in 1952 and 1953. The fungus appeared to be confined to the underground parts of the plant and was observed on the leaves only occasionally when the plants had collapsed completely. It was extremely pathogenic to lettuce seedlings grown in inoculated sand.

Tourte (R.) & Collot (L.). **Les parasites de la graine d'Arachide. Influence sur la levée. Traitement des semences.** [The parasites of Groundnut seed. Effect on emergence. Seed treatment.]—*Bull. agron. Fr. d'out. mer* 5 (*1949*), pp. 51–62, 1 pl., 4 figs., 1 diag., 3 graphs, 1951.

Tests of four dusts during 1949 and 1950 for the fungicidal treatment of groundnut seed against [unspecified] fungi at Bambey, Senegal [*R.A.M.*, 30, p. 212 and following abstracts], demonstrated the efficacy of S.A.E. 1004 at 0·3 per cent. during wet winter weather. Results with five products in the dry season were inconclusive.

Sauger (L.) & Thevenin (Mlle L.). **Facteurs de production de l'Arachide en fonction de la lignée et du traitement fongicide des semences.** [Factors in the production of Groundnuts in relation to the progeny and fungicidal treatment of the seed.]—*Bull. agron. Fr. d'out. mer* 6 (*1950*), pp. 70–81, 1 diag., 1951.

Further investigations of groundnut production at Bambey, Senegal [see preceding and next abstracts], demonstrated the importance of choosing lines giving a high germination percentage, low mortality during plant growth, and a high average yield per plant. The germination percentage was raised considerably by seed treatment with S.A.E. 1004 dust at only 1·5 per 1,000 [cf. loc. cit.], though the beneficial effect did not make up for poor germination in certain lines. Thus the late, prostrate line 24–11 reacted to the fungicide by an increase in the percentage emergence and the number of plants alive at harvest but not in pod yield, whereas line 28–206 (late erect) improved from each aspect.

Once the line best suited to the region in question has been selected it remains

to be decided whether seed treatment is necessary and, if so, the most satisfactory dosage, as this appears to vary with each line.

JAUBERT (P.). **Poursuite des études sur l'emploi de poudres fongicides pour le traitement des semences d'Arachides.** [Continuation of studies on the use of fungicidal dusts for the treatment of Groundnut seeds.]—*Bull. agron. Fr. d'out. mer* 7 (*1951*), pp. 167–176, 2 diags., 3 graphs, 1952.

Further studies on the treatment of groundnut seeds were conducted in 1951 at Bambey, Senegal [see preceding abstracts], using ten fungicidal dusts and line 28–206 [see next abstract], previously found to be susceptible to parasitic fungi (*Penicillium 'glaucum'*, *Aspergillus niger* [*R.A.M.*, 33, p. 202], and *Sclerotium rolfsii*). Biormone (thiram plus a growth hormone), S.A.E. 1109, and 50 per cent. arasan were particularly effective, the percentages of plants surviving at harvest over the untreated being 26, 23, and 22, respectively. The proportion of plants at harvest in relation to the number of seeds sown varied considerably according to the dust employed, owing to lack of uniformity in the soil and in fungus attack. Other preparations giving final stands significantly superior to the control were S.A.E. 1069, gammoran (organo-mercurial plus *gamma*-BHC), mercoran (organo-mercurial), S.A.E. 1004, verisan (organo-mercurial containing 1·5 per cent. mercury salt), and sanigran (organo-mercurial).

The normal rate of sowing in Senegal is 60 kg. seed per ha. To increase the number of stalks harvested by 26 per cent. another 15 kg. seed would be needed. The same result would be obtained by the use of fungicide.

Maximum pod yield depends on coverage of the seed by the fungicide and adherence, rapidity of emergence and the inhibitory action or efficiency of the fungicide at emergence and during plant growth, proportion of plants harvested, and yield increase. The results obtained in 1951 in comparison with those of the two previous years indicate that the efficiency of the products varies, owing to prevailing climatic conditions. In general the commercial products gave comparable results.

JAUBERT (P.). **Étude de moyens de lutte contre la cercosporiose de l'Arachide au Sénégal.** [A study on the means of controlling Groundnut cercosporiosis in Senegal.]—*Bull. agron. Fr. d'out. mer* 7 (*1951*), pp. 177–194, 1 diag., 1952.

Experiments on the control of groundnut leaf spot in Senegal caused by *Cercospora personata* and *C. arachidicola* [*R.A.M.*, 32, p. 661] were carried out in 1951 using the susceptible line 28–204, fairly resistant 28–206 [see preceding abstract], and resistant 24–11, and the dusts sofril, sofril plus viricuivre 50 (90-10), and sofril plus cuprol 16 (90–10), all at 75 to 80 kg. per ha. applied three times at 15-day intervals. Yield increases in all varieties were low, for the following reasons. Line 28–204 was very heavily attacked and dusting began too late; 28–206 gave a yield increase of 17 per cent. per lot over the control but more is not possible owing to the short growth cycle; 24–11 was only slightly attacked.

The following points emerge from the results. The disease appears at about the same time on each line, i.e., a month and a half after sowing. Susceptibility should determine the time of the first treatment: 28–204 as soon as the first spots appear, 28–206 fifteen days to three weeks after, and 24–11 one month after (if at all). Sofril plus cuprol is dangerous and ineffective and will be abandoned. Additional treatments need only be given after rainfall. The line of future work is indicated.

FRASER (I. M.). **The growth-promoting effect of indole-3-acetic acid on the common cultivated Mushroom, Psalliota hortensis (Cooke) Lange forma albida Lange.** – *Aust. J. biol. Sci.*, 6, 3, pp. 379–395, 2 graphs, 1953.

A strain of the white-capped form of the cultivated mushroom appeared unable

to grow appreciably in a liquid basal medium containing glucose, asparagine, and mineral salts. Indole-3-acetic acid (IAA) in concentrations of from 5 to 100 mg. per l. markedly increased growth, particularly when thiamine and biotin were present, but only when the inoculum was floating on the surface of the medium, not when it was submerged. Both floating and submerged mycelia increased markedly with the addition of extracts of yeast, cotton wool, and compost. The fungus grew fairly well on the basal medium solidified with agar purified to remove vitamins, but additions of IAA at 10 and 100 mg. per l. almost completely prevented initial growth, lower concentrations being without effect; after about 30 days vigorous growth began in the medium originally containing 10 mg. per l. IAA and proceeded at the same rate as in its absence. It seems probable that this was due to inactivation of the IAA by the small amount of mycelium formed.

Nagai (Y.), Aoshima (K.), & Kobayashi (T.). **Some physiological characters of the basidiospores of Cortinellus edodes (Berk.) S. Ito et Imai.**—*J. Jap. For. Soc.*, 34, 5, pp. 145–149, 1 fig., 8 graphs, 1952. [Japanese, with English summary.]

The basidiospores of the 'shiitake' mushroom, *Cortinellus edodes* [cf. *R.A.M.*, 32, p. 535], germinate readily between 15° C. and 30° on various media but not in distilled water. At 20° and a relative humidity of 10 per cent. they retained their vitality for three months, 70 per cent. germinating. Between 20° to 25° and at a relative humidity of 33 per cent. less than 10 per cent. were still viable after 110 days. Exposure of the basidiospores to direct sunlight for more than 30 minutes killed them.

Groenewegen (J. H.). **Het enten van Komkommers en Melonen.** [The grafting of Cucumbers and Melons.] –*Meded. Dir. Tuinb.*, 16, 3, pp. 169–183, 6 figs., 1 graph, 1953. [English summary.]

Drawbacks to the otherwise effective method of grafting cucumbers, e.g., on *Cucurbita ficifolia*, which has been widely practised in Holland since 1947 for the control of *Fusarium* [cf. *R.A.M.*, 23, p. 373], are a tendency to foliar chlorosis and the risk of transmitting *Cucumis* virus 2 [cucumber green-mottle mosaic virus] in the course of the operations.

Davis (G. N.). **Baby Klondike Watermelon.**—*Calif. Agric.*, 6, 5, p. 15, 2 figs., 1952.

Baby Klondike watermelon, a new hybrid between Baby Delight and Klondike R–7, resistant to *Fusarium* wilt [*F. bulbigenum* var. *niveum*: *R.A.M.*, 33, p. 72], was developed at the University of California, Davis. Small amounts of stock seeds were commercially released in the autumn of 1949.

Dias (H. F.). **Informação sobre a 'maromba' do Douro.** [Information on the 'pole' of Douro.]—Reprinted from *Bol. Casa do Douro, 1953*, 85, 4 pp., 1953.

A disease affecting vines in the province of Douro, Portugal, known as 'pole' and suspected by Prof. S. J. Du Plessis, of Stellenbosch, South Africa, who visited the region in 1948, to be identical with Pierce's disease [due to lucerne dwarf virus], was shown by investigations carried out at Sacavém from 1949 to 1951 to be caused by boron deficiency [*R.A.M.*, 32, p. 363]. The symptoms include the development of chlorotic lesions, separated by green bands, between the leaf veins; rolling, malformation, and drastic shortening of the leaves; reddening of the parenchyma between the veins and along the leaf margins, with necrosis advancing progressively from the periphery to the centre, and defoliation; cessation of normal growth in June, followed at a later stage by the development of branches with short internodes and small, deformed leaves; extreme insipidity and roughness of the ripe fruit; and generalized stunting of the plants. Satisfactory control may be effected by soil amendments with sodium borate at the rate of 4 gm.

per stock (24 kg. per ha.) in February and June, as well as by spraying with the same compound at a strength of 0·5 or 1 per cent., using 6 to 8 gm. per stock, in the second half of February or the early days of March, and repeating once or twice if necessary (at the lower concentration) in combination with Bordeaux mixture during the early stage of growth before the flowers open.

MARAMOROSCH (K.). **Incubation period of Aster-yellows virus.**—*Amer. J. Bot.*, 40, 10, pp. 797–808, 1 fig., 1953.

In further work at the Rockefeller Institute for Medical Research, New York, the incubation period of aster yellows virus [*R.A.M.*, 31, p. 221; 33, p. 12] was studied in China aster (*Callistephus chinensis*) and the aster leafhopper (*Macrosteles divisus*) [32, p. 679]. In the plants the shortest incubation periods were eight days in the greenhouse and nine under controlled conditions, both at 25° C. At 20° the minimum incubation period was 18 days; no disease developed at 10°. The length of the incubation period was independent of the number of feeding, infective insects and of the length of their feeding. Virus was recovered from plants one day before symptom appearance but not earlier. It moved from the inoculated leaves within one day.

In insects the incubation period was shortest at 25° and 30° (12 and 11 days, respectively) and longer (16 days) at 20°. It was not completed within 45 days at 10°, but transmission was secured with good transmitters at this temperature. Insects kept at 30° gradually ceased to transmit. Immediate transmission could be secured from insects injected with large virus doses [31, p. 221]. Evidence of the presence of developmental stages in the life cycle of the virus is discussed. Infective and non-infective stages seem to exist in both plant and insect.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 1, 7, pp. 110–111, 1953.

Plant quarantine regulations issued in January and February, 1953, controlling the importation of plants and plant materials into the French overseas territories (including those free from *Hemileia vastatrix* [*R.A.M.*, 32, p. 365], where the entry of coffee plants is regulated, and Réunion) and Netherlands New Guinea are briefly summarized.

News and notes. European Plant Protection Organization.—*F.A.O. Pl. Prot. Bull.*, 1, 8, pp. 126–127, 1953.

At its third meeting, on 15th April, 1953, the Council of the European Plant Protection Organization accepted a recommendation to the effect that Governments should be advised to take legal powers, if necessary, to prevent the deliberate introduction into and multiplication within their countries of extra-European parasites or predators, including micro-organisms for the biological control of plant pests.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 1, 9, pp. 141–142, 1953.

Under an Order of 30th April, 1953 (*J. off. Algérie*, 27, 36, 1953), the importation into Algeria of chestnut wood from countries where *Endothia parasitica* [C.M.I. map No. 66] is present may be authorized only when the consignment is accompanied by a certificate attesting that the wood has been steam-sterilized for half an hour at 80° C.

An Order of the Ministry of Agriculture, Spain, of 14th March, 1953 (*Bol. Estado*, March, 1953), prohibits the importation into Spain of living plants, parts thereof, vegetables, fruits, and seeds from any country in which citrus tristeza [virus: *R.A.M.*, 31, p. 182; 32, pp. 480, 555; 33, pp. 24, 80], citrus black spot (*Phoma* [*Guignardia*] *citricarpa*) [C.M.I. map No. 53], or Pierce's vine disease [lucerne dwarf virus: No. 262; *R.A.M.*, 33, p. 137] has been recorded.

New or uncommon plant diseases and pests in England and Wales.—*Plant Path.*, 2, 3, pp. 105–106, 1953.

Comparison by E. T. Roberts of a fungus found between the scales of a narcissus bulb with *Stagonospora curtisii* [*R.A.M.*, 30, p. 322; 33, p. 209] showed that the two organisms were identical [13, p. 167]. This finding confirms Feekes's observation [cf. 10, p. 794].

J. E. E. Jenkins reports that in October, 1952, many *Primula* plants growing in a nursery at Bricket Wood, Herts., bore on their roots the 'corps miliaires' of *Helicobasidium purpureum*, not previously recorded, apparently, on *Primula*.

June V. Ives records experiments at Cambridge in 1952 in which seedlings of *Solanum nigrum*, *S. dulcamara*, *S. douglasii*, *S. rostratum*, *S. nodiflorum*, *S. tomentosum*, and *S. pyracanthum* in boxes containing sterilized soil mixed with pieces of potato skin bearing lesions caused by *Spongospora subterranea* [32, p. 470] developed no galls on the roots when transplanted into either greenhouse or outdoor beds, nor did Moneymaker and Open Air Wonder tomatoes or *S. mineatum* plants in greenhouse plots, but those in the outdoor plots developed galls, chiefly at the base of the taproot.

New or uncommon plant diseases and pests in England and Wales.—*Plant Path.*, 2, 4, p. 140, 1 fig. (between pp. 122 and 123), 1953.

Moira C. D. Justham and L. Ogilvie state that 'net blotch' (*Pleospora herbarum*) caused premature defoliation of thick stands of broad beans [cf. *R.A.M.*, 10, p. 766; 23, p. 127] in Somerset, Gloucestershire, Wiltshire, and Dorset in 1947, but is now less common. Ash-grey blotches, with ill-defined, net-like or dendritic margins extend over the older leaflets, which become brittle and fall. Under moist conditions, typical conidia [18, p. 141] are produced. The fungus can overwinter on stacks of dead bean haulm and will infect bean plants in the vicinity in early spring. It was prevalent on lucerne [cf. 20, p. 306] in 1950 and 1951, when it could not be found on bean.

H. E. Croxall and F. Joan Moore report that in March, 1953, small groups of Pioneer barley plants scattered throughout a crop at Darlington, Co. Durham, were infected by *Typhula itoana* [30, p. 124], recorded only once before in Britain [25, pp. 217, 569].

Plant diseases. Motley dwarf of Carrot. Anthracnose of French Beans.—*Agric. Gaz. N.S.W.*, 63, 12, pp. 653–656, 5 figs., 1952. [Received 1953.]

Information about the incidence, symptoms, and transmission of the motley dwarf virus disease of carrots in Australia has already been noticed from another source [*R.A.M.*, 32, p. 659]. This is the most widespread and serious disease of carrots in New South Wales. The varieties Danvers Half Long, Imperator, Nantes, Oxheart, and Short Horn are all susceptible, while Osborne Park is susceptible but tolerant. Control is effected by growing tolerant varieties in districts where the virus is established and by the application of DDT (0·1 per cent. spray or 2 per cent. dust) to kill the aphid vector, *Cavariella aegopodii*. Carrots sown from mid-December to the end of January usually remain healthy and mature normally, but later sowings become infected in the autumn.

Serious losses in bean [*Phaseolus vulgaris*] crops are caused by anthracnose (*Colletotrichum lindemuthianum*) [26, p. 373]. The stringless varieties Refugee No. 5, Idaho Refugee, and Logan are tolerant of both strains of the fungus found in New South Wales [33, p. 211]. The disease spreads rapidly in consignments for transit; special care should, therefore, be taken not to include any spotted or wet pods, and to provide good ventilation between the cases. Control in the field includes the use of certified seed, crop rotation of at least two years, the

use of resistant varieties, roguing infected plants, and spraying with Bordeaux mixture.

THIRUMALACHAR (M. J.) & MISHRA (J. N.). **Some diseases of economic plants in Bihar, India. I and II.**—*F.A.O. Pl. Prot. Bull.*, 1, 10, pp. 145–146; 2, 1, pp. 11–12, 1953.

Diseases of economic plants observed in Bihar, India, in 1952–3 included wilt (*Operculella padwickii*) of gram (*Cicer arietinum*) [*R.A.M.*, 32, p. 544], not previously recorded in Bihar, blast of *Eleusine coracana* caused by *Piricularia grisea* [cf. 26, p. 393], rice false smut (*Ustilaginoidea virens*) [26, p. 125], onion purple blotch (*Alternaria porri*) [cf. 30, p. 598; 31, p. 173; 33, p. 201], and a watery rot of oranges and lemons due to *Oospora citri-aurantii* [C.M.I. map No. 124].

Gram wilt killed nearly 70 per cent. of the plants. As infection occurred when the pods were setting, considerable reduction of yield resulted. The losses caused by *P. grisea* ranged from 10 to 15 per cent. and were mainly due to failure of grain formation.

Rice false smut occurred in Islampur, Purnea, on the border of Bengal, where the disease is known to be severe. *Entyloma oryzae* [*R.A.M.*, 24, p. 472] and *Neovossia horrida* [24, p. 471] are somewhat common in the western part of Bihar.

Purple blotch caused severe scorching of some onion varieties at the College of Agriculture, Sabour, but the indigenous red variety has remained unaffected. The losses caused among stored oranges and lemons by *O. citri-aurantii* were usually heavy. Externally the affected area appeared water-soaked. Internally the diseased portion appeared as a soft, watery pulp. Fruits left overnight in a humid atmosphere developed a white, powdery coating of conidial chains. The vendors rub the powder off with a rag before displaying the fruits for sale, and the same rag is then used on all the other fruits. Stocks are usually sold before disease symptoms appear on fruits originally relatively healthy, but if storage lasts for about a week considerable rotting occurs.

Severe wilt of eggplants was due to *Sclerotium rolfsii* [cf. 27, p. 47]. The fungus also caused wilting of potato and tomato plants in restricted areas. Soil treatment with paradichlorobenzene [cf. 32, p. 432] at the rate of ½ oz. crystals per five plants appeared to reduce wilting by 60 per cent. *Myrothecium roridum* [27, p. 309; 29, p. 537] caused leaf spotting of tomato, okra (*Hibiscus esculentus*), and green mung bean (*Phaseolus radiatus*). *A. tenuis* [cf. 32, p. 284] caused hard, sunken, greyish-black, later greenish-black, circular, cankered spots 2 to 3 mm. wide, often enlarging to 1 cm., on tomatoes planted or harvested late (i.e., harvested up to the end of May). Large stocks of such late-harvested tomatoes developed watery rot due to *O. lactis-parasitica* [cf. 25, p. 368]. Large patches of groundnuts and green mung beans were killed in the field by a species of *Rhizoctonia* producing web blight symptoms and basidiospores. In culture the basidiospores gave rise to mycelium with large sclerotia. Infection was mostly on the aerial parts.

MILLER (P. R.). **Plant disease situation in the United States.**—*F.A.O. Pl. Prot. Bull.*, 1, 11, pp. 163–165, 1953.

The author gives a brief account of larch canker (*Dasyscypha* [*Trichoscyphella*] *willkommii*) in the United States and the progress made in its control [*R.A.M.*, 7, p. 285; 32, p. 651]. Fly speck (*Leptothyrium pomi*) [19, p. 291; 32, p. 568] was identified on Double Red Delicious and Newtown Pippin apples in the Valencia district of Santa Cruz County, California, in 1951. This is believed to be the first report of the disease from California. Limited observations suggest that the condition is of serious consequence locally.

Outbreaks and new records. Israel.—*F.A.O. Pl. Prot. Bull.*, 2, 1, pp. 13–15, 1953.

Brief notes are given on the chief plant pests and diseases observed in Israel from May to August, 1953, including, *inter alia*, *Sclerotium rolfsii* [*R.A.M.*, 32, p. 424] which caused losses of up to 50 or 60 per cent. in sugar beet fields in which lifting was delayed. *Puccinia helianthi* caused significant losses of sunflowers [26, p. 110] throughout the country.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, 1, 11, pp. 172–173, 1953.

H. W. Moll reports that bananas at the demonstration farm, Kota Radja, near Hollandia, Netherlands New Guinea, are severely affected by *Cercospora musae* [*Mycosphaerella musicola*: C.M.I. map No. 7].

Grey mould, probably *Botrytis cinerea*, was found on beans [? *Phaseolus* sp.] in Oransbari, south of Manokwari; varieties with violet seed were more severely affected than those with brown seed.

Démétriadès (S.) & Nitsch (J. P.). **Jus de Tomate et croissance des tissus et des organes végétaux. Action sur trois catégories de tissus de Vigne-Vierge et de Scorsonère. Comparaison avec le lait de Coco.** [Tomato juice and growth of tissues and plant organs. Action on three categories of Virginia Creeper and *Scorzonera* tissue. Comparison with Coco-nut milk.]—*C. R. Soc. Biol., Paris*, 147, 21–22, pp. 1711–1713, 1 graph, 1953.

In experiments at the Laboratory of Plant Physiology, Versailles, France, the action of tomato juice on normal, 'accustomed', and crown gall [*Bacterium tumefaciens*] tissues of *Parthenocissus tricuspidata* and on 'accustomed' and crown gall of *Scorzonera* [*R.A.M.*, 33, p. 217 and next abstract] was variable, depending not only on the tissue category but also on the plant species, whereas coco-nut milk was uniformly stimulatory, at any rate at concentrations below 50 per cent. Thus, tomato juice strongly inhibited the 'accustomed' tissues of both hosts and crown gall of *Scorzonera*, while stimulating the normal and crown gall tissues of *P. tricuspidata*, not only more powerfully but also at lower strengths than coco-nut milk.

Démétriadès (S. D.). **Sur un cas de différentiation des tissus de crown-gall de Scorsonère cultivés in vitro.** [On a case of differentiation of *Scorzonera* crown gall tissues cultured *in vitro*.]—*C. R. Soc. Biol., Paris*, 147, 21–22, pp. 1713–1715, 1 fig., 1953.

At the Benaki Phytopathological Institute, Kiphissia, Athens, fragments of five-year-old crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) tissue isolated from *Scorzonera* [see preceding abstract] were grown on Heller's medium with the addition of 5 per cent. glucose and 10^{-6} aneurin [vitamin B_1]. One of them produced a root of perfectly normal appearance and structure which rapidly attained a length exceeding 1 cm. Thus, there was an apparent reversion of crown gall cells to normal after protracted culture *in vitro* [cf. *R.A.M.*, 33, p. 19].

Gainor (C.) & Price (W. C.). **Studies concerning colonial variants of Agrobacterium tumefaciens.**—*Phytopathology*, 43, 9, pp. 509–512, 2 figs., 1953.

At the University of Pittsburgh, Pennyslvania, a highly virulent strain (B6) of *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 33, p. 144] gave rise in nutrient agar cultures to three morphologically distinct forms [cf. 9, p. 703], a smooth form designated $B6_1$, $B6_2$,with lobate colonies and radial striations, and $B6_3$, presenting a more wrinkled appearance. They did not differ, however, in their pathogenicity to *Kalanchoe daigremontiana*. The stability of the three colony types was remarkable in galls on *Kalanchoe* and was maintained for more than nine months by

subculturing on nutrient agar at two- to four-day intervals, but reversion to the smooth type occurred in certain other transfers.

MATSUI (C.). **Inactivation of SP_1 virus (solanacearum phage α) by ultraviolet light.** —*Sci. Bull. Fac. Agric. Kyushu Univ.*, 12, 4, pp. 321–325, 1 fig., 1 graph, 1952. [Japanese, with English summary. Received 1953.]

In the Laboratory of Plant Pathology, Kyushu University, Japan, SP_1 virus (*solanacearum* phage α) [*R.A.M.*, 32, p. 404] suspended in distilled water was inactivated by light of less than 3100 Å. The rate of inactivation was a logarithmic function of the dose of irradiation. Inactivated virus was adsorbed by and killed the host bacterium, *Bacterium* [*Pseudomonas*] *solanacearum* S strain.

MACLEAN (J. A. R.). **Some chemical aspects of 'black pod' disease in West African Amelonado Cacao.**—*Emp. J. exp. Agric.*, 21, 84, pp. 340–349, 2 graphs, 1953.

Investigations were made at the West African Cacao Research Institute, Tafo, Gold Coast, of the quantitative differences in the various constituents of healthy cacao beans and those affected by black pod (*Phytophthora palmivora*) [*R.A.M.*, 32, p. 305; 33, p. 218 and next abstract] obtained both from random harvesting in the field and from pods inoculated on the trees with a spore suspension of the fungus. It was found that inoculated pods turned black in 14 days, the radicles of all beans were infected in 21, but fungal hyphae were not present in the cotyledons until after 32 to 36 days. In beans containing fungus mycelium in the radicle there was an appreciable increase in the free fatty acid content (up to 34 per cent.) of the fat and a significant decrease in the percentage of theobromine and sucrose. Fat and total and protein nitrogen were constant in both healthy and black pod beans.

ORELLANA (R. G.). **Infection and tissue changes of Theobroma cacao L. by Phytophthora palmivora Butl.**—*Turrialba*, 3, 4, pp. 167–172, 9 figs., 1953. [Spanish summary.]

The mode of infection of flowers, flowering cushions, pods, stems, and leaves of cacao by *Phytophthora palmivora* [*R.A.M.*, 32, p. 70] was studied in histological sections at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica. Tissue changes in the flowers could not be studied in detail because of the rapidity of rotting. Flower cushions were discoloured down to the pith. Appressoria and hyphae formed in the pod [see preceding abstract] three hours after inoculation, causing discoloration of the epidermis and underlying tissue. In recently infected pods the fungus was isolated even from beneath the endocarp. The internal production of chlamydospores, sporangia, and what appeared to be oospores took place only within the uppermost cavities of the mesocarp in living pods. It is postulated, therefore, that the fungus may survive within these cavities and escape destruction by a contact fungicide. In young, succulent stems and the cortical layers of cankers and woody stems that had died back intercellular hyphae and intracellular haustoria were present. New lysigenous cavities formed and enlarged in the cortical layers of both types of stems, apparently due to fungus invasion.

Appressorial structures in close contact with the epidermis were observed on the leaves three hours after inoculation, the ventral tip piercing the walls of cells 48 to 96 hours after inoculation. Wounds also provided an excellent means of penetration and resulted in more rapid symptom expression than infection through intact surfaces. Branched haustorial structures [33, p. 47] were seen within the cell cavities of the leaf epidermis and in the palisade mesophyll. The epidermis and underlying tissues near the point of infection were discoloured deep brown and the cells plasmolysed. The mucilaginous lysigenous cavities in the palisade and midrib

were enlarged. Enlargement of existing lysigenous cavities, apparent formation of new cavities in the later stages of disease, disintegration of the basal and apical pulvinus, and discoloration and collapse of glandular hairs were more severe in the petioles of young leaves than in older ones.

It appears, therefore, that the young, succulent leaves are more susceptible than mature leaves, and that disease incidence may be reduced by spraying mainly during the two peaks of leaf formation in Costa Rica. Records of pod rot incidence kept at the La Lola plantation indicated that infection by *P. palmivora* reaches the annual maxima during or immediately following these two flushes.

McGinnis (R. C.). **Cytological studies of chromosomes of rust fungi. I. The mitotic chromosomes of Puccinia graminis.**—*Canad. J. Bot.*, 31, 5, pp. 522–526, 1 pl., 1953.

At the Cereal Division, Department of Agriculture, Ottawa, germinating basidiospores of *Puccinia graminis* showed a haploid number of six chromosomes in three loose pairs at the metaphase stage of mitosis [cf. *R.A.M.*, 19, p. 167]. Prophase chromosomes were united to form a continuous chain, the limits of individual chromosomes not being distinguishable at this stage. The possibility of a basic chromosome number of three for *P. graminis* is discussed.

Livingston (J. E.). **The control of leaf and stem rust of Wheat with chemotherapeutants.**—*Phytopathology*, 43, 9, pp. 496–499, 1953.

In pursuance of studies demonstrating the possibility of fungicidal control of wheat stem rust (*Puccinia graminis*) [*R.A.M.*, 32, p. 368], 179 chemicals were tested at the Nebraska Agricultural Experiment Station to determine their toxicity to this species and leaf rust (*P. rubigo-vera tritici*) [*P. triticina*]. The latter was easier to grow in the greenhouse than the former, and since both reacted similarly to the treatments, *P. triticina* was used in most of the tests. Inoculation was accomplished by diluting the uredospores with talc in a cyclone apparatus [30, p. 114] and dusting the mixture on two-week-old Cheyenne winter wheat seedlings, which were incubated for 24 hours in an illuminated moist chamber at 70° F. and then returned to the greenhouse (where the temperature was maintained at 65° except in late spring, when it frequently rose to 80°) for 96 hours before treatment. The chemicals (each supplemented by 0·1 per cent. triton wetting agent) were sprayed on the plants with an atomizer until run-off occurred.

Calcium, ammonium, and sodium sulphamates were very effective in the prevention of pustule development in the greenhouse. The calcium salt gave the widest margin of safety and proved equally efficient, applied at the rate of 5 gals. per acre from an Aeronca monoplane flying at a speed of 70 to 75 miles per hour with the spray boom 4 ft. above the heads, in combating *P. triticina* on Cheyenne in the field at Lincoln, Nebraska, and *P. graminis* on Baart near Toluca, Mexico. The only deleterious effect appears to have been a slight reduction in the germinability of the seed from treated plants.

Actidione acted similarly to calcium sulphamate in the greenhouse and was partially effective against *P. graminis* in the field at 50 p.p.m. three weeks after application but not at harvest time. Further field trials with higher concentrations should be performed, but the margin between fungicidal efficiency and phytotoxicity is very narrow.

Thomas (I.) & Reeves (J.). **Wheat variety trials on research stations, 1952.**—*J. Agric. W. Aust.*, Ser. 3, 2, 2, pp. 201, 203, 205, 207, 209, 211, 1953.

In Western Australia race 126B of wheat stem rust [*Puccinia graminis*: *R.A.M.*, 29, p. 610; 32, p. 425; 33, p. 221 and next abstract] has been isolated from collections extending over several years. The complex of races first discovered in New

South Wales in 1948 [32, p. 425] does not appear to be present locally as yet and varieties attacked by this complex, such as Gabo [31, p. 597; 33, p. 209], Yalta [loc. cit.], Bencubbin 48 [28, p. 622], Javelin 48 [loc. cit.], and Insignia 49 can, therefore, still be regarded as resistant in Western Australia. In addition, the varieties Dowerin [29, p. 611], Festival, Warigo, Panther, and the new crossbreds M.107, M.108, M.109, and M.112 are resistant to all races of stem rust known to be present in Australia.

The characteristics of the varieties under trial at five research stations are tabulated. Highly resistant to flag smut [*Urocystis tritici*: 30, p. 407 and next abstract] are Bungulla, Bencubbin, Wongoondy, Yalta, Warigo, M.109, and M.112.

Thomas (I.) & Reeves (J.). **New cereal varieties in Australia.**—*J. Agric. W. Aust.*, Ser. 3, 2, 2, pp. 213–214, 1953.

During 1952 four new wheat varieties, Spica [*R.A.M.*, 31, p. 597], Saga, Sabre, and Reldep, and one new flax variety, Boyup, were accepted for registration in Australia. Saga (Pusa IV × Gunnedah 3 × Gabo) is resistant to flag smut [*Urocystis tritici*: see preceding abstract] and stem rust [*Puccinia graminis*] races 126 and 126B [loc. cit.], moderately resistant to leaf rust [*P. triticina*: 31, p. 597; 33, p. 289] races 26 and 95, but susceptible to the new stem rust complex [see preceding abstract] and to leaf rust races 135 and 138. Sabre, selected from Gabo × (Nabawa × Dan × Dundee) × (Dundee × Kenya C. 6042), is resistant to flag smut and stem rust (126 and 126B), but susceptible to leaf rust. Reldep, from Ghurka × Dan, resists flag smut but not stem rust. Boyup flax, the result of a natural cross between Wada and Concurrent, is resistant to those races of rust [*Melampsora lini*: 31, p. 185; 32, p. 557] to which Wada [loc. cit.; 26, p. 56] is resistant, but susceptible to race 0 and to that attacking Ottawa 770 B [31, p. 185].

Pugsley (A. T.). **Back-crossing of Wheat for resistance to bunt in South Australia.** —*Emp. J. exp. Agric.* 21, 84, pp. 314–320, 1 pl., 1953.

Breeding experiments at the Waite Agricultural Research Institute, South Australia, having as their objective the incorporation of Doubbi resistance to bunt (*Tilletia caries* and *T. foetida*) [*R.A.M.*, 24, p. 311; 33, p. 146] in three commercial wheat varieties, Ranee, Insignia, and Javelin, have been completed. Resistance appears to be recessive to susceptibility and conditioned by a single major gene tentatively designated 'd', which differs from that described by Briggs *et al.* [30, p. 221]. It is characterized by its effectiveness against five Australian races (T_2 and T_5 of *T. caries* and L_1, L_3, and L_{14} of *T. foetida*), resistance often being expressed as a partial smutting of both ears and grains of resistant plants. In comparative studies, restricted to material containing the M, H, T, and 'd' genes, a characteristic but different pattern of behaviour towards the five Australian races has been established for each variety.

Linskens (H. F.). **Die unterschiedliche Empfindlichkeit von Samen gegenüber Heisswasserbädern (Untersuchungen an Weizen.)** [The divergent sensitivity of seeds to hot water baths (studies on Wheat).]—*Phytopath. Z.*, 21, 1, pp. 45–52, 5 graphs, 1953.

The results of experiments at the Botanical Institute, Cologne, Germany, in which Carstens Dickkopf wheat seed was immersed for two hours in a hot water bath at 47° C. and re-dried for 24 hours at 35° for the control of loose smut [*Ustilago tritici*: *R.A.M.*, 31, p. 483 and cf. next abstract], showed that the reaction of the dormant grain is not a mere function of time and water content but depends on a latent ('echte') periodicity (*Z. Naturf.*, 4b, p. 167, 1949; 6b, p. 108, 1951). Thus,

from the beginning to the middle of August the treatment enhanced germinability and vigour but from September onwards it reduced them. On this basis, therefore, it should be practicable to determine for individual lots of seed the period at which the treatment can be applied with minimum risk.

Pichler (F.). **Zur Frage der Warmwasserbehandlung des Saatgutes bei der Flugbrandbekämpfung. I. Mitteilung.** [On the question of the hot water treatment of seed in loose smut control. Note I.]—*PflSchBer.*, 11, 9–12, pp. 129–150, 2 figs., 1 graph, 1953. [English summary.]

In experiments at the Plant Protection Institute, Vienna, on the control of wheat and barley loose smuts [*Ustilago tritici* and *U. nuda*, respectively: cf. *R.A.M.*, 33, p. 78 and preceding abstract] by immersion for varying periods (up to four hours) in water at temperatures ranging from 5° to 45° C., electrolytic substances, mainly potassium and phosphorus, and non-electrolytic, e.g., sugar and phosphatides, diffused from the grain into the water, producing discoloration and turbidity. The quantity of phosphorus released from wheat was shown to depend on several factors, such as the temperature of the water and duration of treatment, reaching a maximum after three hours at 45°, and on the variety used, being most freely released from Marchfelder winter wheat. It was further influenced by the admixture of chemicals with the water, an important reduction being effected by 0·5 per cent. sodium carbonate but not by germisan or ceresan at 0·025 per cent. The capacity attributed to such fungicides for counteracting damage to the seed from hot water treatment [*R.A.M.*, 17, p. 594; 23, p. 11] would appear, therefore, to be due to their soda-containing spreaders, as already demonstrated by Linskens (*Züchter*, 20, p. 168; *Z. PflKrankh.*, 57, p. 177, 1950).

Wahlin (B.). **Vetet och stråbassjukdomarna.** [Wheat and straw base diseases.]—*Växtskyddsnotiser, Stockh., 1953*, 4, pp. 53–57, 1953.

At the Linköping branch of the Plant Protection Institute the examination of wheat samples from the Örebro district of Östergötland, central Sweden, where foot rots (*Ophiobolus graminis*, *Cercosporella herpotrichoides*, and *Fusarium* spp.) [*R.A.M.*, 31, p. 103; 33, p. 76] were epiphytotic in 1953, clearly demonstrated the influence of the preceding crop on the development of infection, especially by *C. herpotrichoides*. Thus, spring wheat following hemp contracted an average of 5 per cent. infection by *C. herpotrichoides*, 37 per cent. by *O. graminis*, and 4 per cent. by *F.* spp., compared with 38, 41, and 3, respectively, after barley. Stable manure increased foot rots but calcium cyanamide applied shortly before autumn ploughing and again in the very early spring was very effective in control.

Oksent'yan (U. G.). Этиология черного бактериоза Пшеницы. [Etiology of the black bacteriosis of Wheat.]—Микробиология [*Microbiology, Moscow*], 21, 2, pp. 205–209, 1952.

Experimental studies at the Moscow branch of the Institute of Agricultural Microbiology have shown that blackening symptoms of the upper parts of wheat ears typical of black chaff (*Xanthomonas translucens* var. *undulosa*) are caused under certain conditions by external factors, such as high temperature (30° to 35° [C.]) with increased humidity; the bacterium is not present [cf. *R.A.M.*, 31, p. 485].

Converse (R. H.). **The influence of nitrogenous compounds on the growth of Helminthosporium gramineum in culture.**—*Mycologia*, 45, 3, pp. 335–344, 3 graphs, 1 diag., 1953.

In studies at the Division of Plant Pathology, University of California, Davis, cultures of *Helminthosporium gramineum* from barley exhibited a marked growth

response to barley plant extracts and to products diffusing from the germinating seeds. In the early growth stages in a liquid medium containing glucose and salts the ammonium ion was utilized in preference to nitrate. Growth was stimulated by peptone but not by the B vitamins it contained [cf. *R.A.M.*, 28, p. 478]. Certain amino acids plus ammonium nitrate supported better growth than ammonium nitrate alone. With L-tyrosine, L-proline, glycine, DL-valine, β-alanine, or DL-threonine growth equalled or surpassed that in peptone, and approached that obtained with barley extracts. The results indicate a possible relationship between the amino acid status of barley seedlings and the establishment of the fungus in the host [cf. 33, p. 287].

Hiura (U.) & Heta (H.). **Studies on the disease resistance in Barley. II. Physiologic races of Erysiphe graminis hordei in Japan.**—*Ber. Ōhara Inst.*, 10, 1, pp. 11–28, 1 map, 1953.

Between 1950 and 1952 two biotypes (8B and 8C) of race 8 of *Erysiphe graminis* [*R.A.M.*, 26, p. 386] and three new physiologic races (13, 14, and 15) were isolated from barley in Japan [32, p. 308]. The determination of the two biotypes and race 15 necessitated the addition to Tidd's standard assortment [16, p. 376] of the varieties Colsess C.A. 772, Duplex C.I.2433, and Kairyō-bōzu-mugi. Race 13 was widespread throughout most of the country. Race 8B was prevalent in the Hokuriku district and in the prefectures of Ehime, Kagawa, and Yamaguchi. Race 14 was collected mostly in the region of Kantō-Tōzan, eastern Japan, while only one isolate was obtained of 8C (Okayama) and of 15 (Tōhoku). Hence it would appear that the variety of barley cultivated in a given locality exerts an important influence on the predominance therein of the several physiologic races of powdery mildew.

Griffiths (D. J.). **Varietal resistance and susceptibility of Oats to crown rust.**—*Plant Path.*, 2, 3, pp. 73–77, 1953.

In greenhouse tests (at 55° to 65° F.) at the Welsh Plant Breeding Station, Aberystwyth, of varietal resistance in oats to *Puccinia coronata* [*R.A.M.*, 24, pp. 176, 178; 32, p. 675; 33, p. 291] 40 varieties and selections were inoculated in the seedling stage with each of eight distinctive physiologic forms of the fungus collected in different parts of Wales and south-western England and not previously characterized. Of nine varieties possessing resistance in the seedling stage to one or more of the cultures, Bond, Clinton, Eaton, Landhafer, Santa Fé, Shelby, Tama, and Victoria appeared to offer most promise for breeding purposes, but in July all varieties and selections grown in the field nursery and having the resistance factors of Bond and Victoria succumbed to two new races, PC–AV_7 and PC–AV_8. Bond was susceptible to both and Victoria to the former only.

Bond, Victoria, Tama, Clinton, and Shelby were extremely susceptible to mildew [*Erysiphe graminis*: 32, p. 553].

Reactions of mature plants to *P. coronata* agreed closely with the results obtained in the seedling stage, but the resistance of some varieties decreased as the plant tissues became older and slight sporulation occurred. This was also apparent where the plants were subjected to natural infection.

Resistance of Bond was conditioned by two dominant factors, while in Landhafer, Sante Fé, and Victoria and its derivatives it was governed by single dominant factors. Observed segregation for reaction to the first six cultures of crown rust identified before July, 1952, in crosses involving Bond and its derivatives and Victoria derivatives confirmed the results of American workers.

With the appearance of a new physiologic form able to attack both Bond and Victoria the development of varieties resistant to all the eight forms referred to can be achieved only by using Landhafer as a parent.

Earhart (R. W.). **Comparisons of Helminthosporium species attacking Oats in Florida.**—*Phytopathology*, 43, 9, pp. 516–518, 1953.

At Florida Agricultural Experiment Station, Gainesville, inoculation tests were performed in 1950 and 1952 on Florida Black rye, Atlas 66 wheat, C.I. 3582 barley (1950 only), Suwan No. 6 barley (1952 only), and Victorgrain and Southland oats with *Helminthosporium victoriae* [*R.A.M.*, 33, p. 71 and next abstract], *H. sativum* [loc. cit.] from wheat and barley, and an isolate resembling and presumed to be identical with the latter species from Southland oats [loc. cit.].

In 1950 the indices of infection for the Southland isolate (in a scale with 0 representing freedom from attack and 4 severe damage) ranged from 0·2 on rye to 4 on oats, and in 1952 (using a single-spore isolate) the figures were similar. *H. sativum* from barley caused the maximum grade of infection on the same host and grades of 0·1 and 0 on Victorgrain oats (in 1950 and 1952, respectively), and 0·1 on rye. The same species from wheat was equally pathogenic (3·8) to wheat and barley in 1950, while the 1952 indices were 4 and 3·9, respectively; in both years it caused no infection on Victorgrain oats and only traces on Southland, whereas rye sustained heavier damage (2·7 and 3·2, respectively). *H. victoriae* proved innocuous in both years to rye and wheat and nearly so to barley and Southland oats, but was highly pathogenic (4) to Victorgrain.

From the results of these trials and a study of the conidial measurements of *H. sativum* and *H. victoriae* [cf. 6, p. 473; 16, p. 524; 29, p. 327], including those reported by H. C. Lowery in a thesis for the University of Georgia, 1950, it is concluded that adequate evidence exists for the maintenance of the two species.

Tveit (M. T.). **Physiological specialization in Helminthosporium victoriae Meehan and Murphy.**—*Acta Agric. scand.*, 4, 1, pp. 63–66, 1 fig., 1954.

Of 127 strains of *Helminthosporium* isolated in pure culture at the Department of Plant Pathology, University of Minnesota, from 21 samples of oat seed from Brazil, 56 were identified as *H. victoriae* [*R.A.M.*, 32, p. 552 and preceding abstract], 49 as *H.* [*Pyrenophora*] *avenae*, 17 as a type rather similar to the foregoing but of a distinctly pink colour, and five as *H. pedicellatum* [21, p. 21]. In inoculation tests on Vicland oats *H. victoriae* was much more highly pathogenic than the other species, the 40 isolates used being grouped in five classes (interpreted as corresponding to an equal number of physiologic races), namely, (1) very strongly pathogenic, causing 70 to 90 per cent. pre-emergence killing and severe infection of the emerging plants; (2) strongly pathogenic, chiefly after emergence, when 80 to 90 per cent. of the plants are killed; (3) and (4) responsible for 30 to 50 and 5 to 20 per cent. post-emergence killing, respectively; and (5) slight discoloration of the mesocotyl but no killing. Five of the isolates were also injurious to Clinton, Bonda, and other varieties outside the Victoria group.

This is believed to be the first record of *H. victoriae* in Brazil [cf. C.M.I. map No. 267].

Harper (J. L.). **Influence of temperature and soil water content on the seedling blight of Maize.**—*Nature, Lond.*, 173, 4400, pp. 391–393, 3 graphs, 1954.

In experiments at the Department of Agriculture, University of Oxford, to determine the effect of temperature and soil moisture content on the liability of maize grain to attack by pathogenic soil fungi, which will form the subject of a later publication, soil from plots grown with maize for two years was divided into four lots, one lot receiving enough water to bring it to its sticky point, two receiving one-half and one-quarter of this amount, and one lot remaining air dry. Virginian White Horsetooth maize (grown fairly widely as a forage crop in Great Britain and subject to damage in cold spring weather) was grown at 1°, 8°, 20°, and 30° C. at each of the four moisture levels.

Time and soil moisture content had significant effects on mortality; temperature as a main effect was not significant, but its interaction with soil moisture was highly so. Damage was least where the treatments resulted in rapid germination and greatest where temperature and soil moisture conditions were such that germination just failed to take place. It is concluded that the pathogens are affected in the same general manner as the host but are more tolerant in their moisture and temperature requirements. The two peaks of greatest damage, 8° at the highest moisture content and 30° at the quarter level, were formed at very different rates: at 30° it was attained by the sixth day; at 8° the degree of injury was initially small but was still increasing after 15 days.

These results are of particular significance in a programme of maize breeding in which the cold testing of varieties is undertaken, as the soil moisture content appears to be the most important single factor influencing their reaction. It is suggested that cold testing should be undertaken in loosely packed soil in open-bottomed fibre pots 6 in. high standing in shallow trays of water throughout the experimental period.

In a further experiment samples of White Horsetooth maize grains with and without previous dressing with thiram [*R.A.M.*, 31, p. 430] were sown in pots standing in water as recommended above and incubated at 0°, 5°, 10°, 20°, and 30°. After ten days all the pots were transferred to a temperature of 20°. It was evident that mortality decreased steadily as the temperature rose from 0° to 20° and that the subsequent rise to 30° had little further effect. The degree of mortality prevented by fungicide dusting increased from 0° to 5° and then fell off and became negligible at 20° and 30°.

Orian (G.). **Occurrence of Puccinia polysora Underwood in the Indian Ocean area.** —*Nature, Lond.*, 173, 4402, p. 505, 1954.

The author reviews the distribution of maize rust (*Puccinia polysora*) [*R.A.M.*, 33, p. 281] and states that its recent occurrence in the Indian Ocean islands [33, p. 23], following the rapid spread in Africa, lends support to the hypothesis of spore dissemination by means of air currents [33, p. 41]. It thus constitutes a threat to Asia and Australia.

Johansson (N.-O). **Sotsvamp på Majs.** [Smut fungus on Maize.]—*Växtskydds-notiser, Stockh., 1953*, 4, pp. 57–58, 1 fig., 1953.

This brief note on maize smut (*Ustilago zeae*) [*U. maydis*: C.M.I. map No. 93] was prompted by the receipt at the Swedish Plant Protection Institute during 1953 of two samples of infected plants, one from Scania and the other from the Stockholm area.

Andrew (R. H.). **Breeding for stalk-rot resistance in Maize : a review.**—*Euphytica*, 3, 1, pp. 43–48, 5 figs., 1954. [Dutch summary.]

The author reviews the procedures and techniques developed by breeders and pathologists in breeding maize for resistance to stalk rot (*Diplodia zeae*, *Gibberella zeae*, and *G. fujikuroi*), based chiefly on experience in Wisconsin [*R.A.M.*, 31, p. 326]. Inbred line W 22 is highly resistant and WF 9 almost resistant.

Dillon Weston (W. A. R.). **Control of Millet smut with formaldehyde.**—*Plant Path.*, 2, 3, p. 87, 1953.

In a comparative test at the National Agricultural Advisory Service, Cambridge, for the control of millet (*Panicum miliaceum*) smut (*Sphacelotheca destruens*) [*R.A.M.*, 32, p. 372] the seed was first damped by being kept in a saturated atmosphere for 5½ hours at 28° C., after which it was shaken with the inoculum in a

closed jar. Formaldehyde (40 per cent.) was used at 1 in 320 and 1 in 160 with each of the following methods, and at the weaker strength the solutions were used with and without the proprietary spreaders T and S. Some of the seed was sprinkled with the solution (being constantly turned meanwhile), while another lot in muslin bags was immersed in the solution for five minutes, after which both lots were left for four hours covered with a cloth steeped in the solution. The seed was treated on 14th May, 1952, dried, and sown thickly the next day.

There were no smutted heads following the 1:320 steep with spreader T or the 1:160 steep. With the 1:320 steep alone or with spreader S, and the sprinkle at 1:160 there was 0·03, 0·08, and 0·5 mean percentage infection, as against 47·5 per cent. for the untreated seed.

Reichert (I.), Yoffe (J.), & Bental (A.). **Shamouti Orange on various rootstocks and its relations to xyloporosis.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 163–184, 3 pl., 3 graphs, 1953.

Observations on Shamouti orange budded on 32 types of rootstock in Mikve Israel demonstrated that stocks highly susceptible to xyloporosis [*R.A.M.*, 14, p. 162; 32, p. 18] are unsuited to Shamouti. When grown in loamy soil the sour oranges of Israel and Baghdad and Valencia orange were resistant. Sour orange from Italy, Bitter-Sweet and Willow-Leaf sour orange from California, Nanas pummelo, Egyptian sour lime, McCarty grapefruit, and various sweet oranges were of less outstanding resistance. In light soil sweet lime and to a lesser degree rough lemon were satisfactory.

Trees affected by xyloporosis almost always displayed symptoms of little leaf [12, p. 90; 20, p. 369]. Symptoms of xyloporosis were often present in the scion as well as the stocks, and sometimes only in the scion. In addition to stem pitting, shallow grooves and striations, and sometimes minute, needle-like protuberances which fitted into minute pits in the inner bark, were present. This last phenomenon was termed 'inverse xyloporosis'.

Littauer (F.) & Nadel-Schiffman (M[ina]). **Incubation period and development stages of Citrus fruit mould.**—*Ktavim*, 2–3, pp. 123–127, 1952. [Hebrew. Abridged English version pp. 31–32. Received 1954.]

Spore dust of *Penicillium italicum* and *P. digitatum* was inoculated by needle pricks into the skin of fruits of Shamouti and Valencia oranges, lemon, and grapefruit, during the picking season at Rehovot, Israel [*R.A.M.*, 31, p. 603; cf. 32, p. 19 and next abstracts]. At a temperature of 18° to 27° C. the shortest incubation period for both fungi on all the hosts was two to three days. At the maximum temperature of 32° to 33° *P. italicum* affected all hosts after two to three weeks, producing pliable brown spots, while *P. digitatum* infection appeared as a black spot round the inoculation prick, and attacked only grapefruit at this temperature after four weeks. The optimum for both fungi was 30°; below 18° the length of the incubation period increased with decrease in temperature until at 5° it was 14 to 38 days. At this point the incubation period of *P. digitatum* was longer than that of *P. italicum*; differences between the hosts were also apparent. When the fruit was fully ripe the incubation periods were shorter, though the degree of ripeness had no effect at the optimum temperature.

Ben-Meïr-Glueck (Y[ohebed]). **Fungi isolated from the air of groves and packing sheds and from the skin of Shamouti Oranges.**—*Ktavim*, 2–3, pp. 135–140, 1952. [Hebrew. Abridged English version pp. 35–37.]

From the air of Shamouti orange groves and packing sheds in Israel and from the skins of the fruits over 30 different species of fungi were isolated during 1937–40.

The only species pathogenic to the fruits occurring constantly and abundantly were *Penicillium digitatum* and *P. italicum* [see preceding and next abstracts].

Minz (G.) & Gutter (Y.). **Post-war survey of diseases in Shamouti Orange groves.** —*Ktavim*, 2–3, pp. 129–134, 1952. [Hebrew. Abridged English version pp. 33–34.]

Observations from the end of October, 1945, to the end of March, 1946, in 14 Shamouti orange groves in different localities in Israel showed that trees on sour orange stock appeared to be in better condition than those on sweet lime. Trees only 11 to 16 years old on sweet lime were affected by *Diplodia natalensis* [*R.A.M.*, 29, p. 617 and following abstracts]. The fungi detected most frequently during the examination of 400 branches in the laboratory were: *D. natalensis*, *Colletotrichum gloeosporioides*, *Fusarium* spp., *Phoma* sp., and *Phomopsis* sp. [see next abstract]. Nevertheless, fruit from well-managed groves showed relatively little stem end rot after the fourth week of storage at 18° C., though *Penicillium digitatum* [see preceding abstracts] and *Phytophthora* spp. produced rot. Brown rot [*P.* spp.: 31, p. 604] was particularly abundant.

During the subsequent season, with one exception, improvement in the condition of the trees was not reflected in decreased stem rot in storage. The superior keeping quality of oranges from trees on sour orange was again due to reduced stem rot. In both years no correlation could be established between the state of health of the trees and the incidence of total rot in the stored fruit.

Botryosphaeria ribis [see next abstract] and *Sphaeropsis* sp. [cf. 29, p. 460] were recorded for the first time on citrus fruits in Israel.

Minz (G.) & Ben-Meïr (Y[ohebed]). **Comparative pathogenicity of potential causal agents of stem-end rot in Shamouti Oranges.**—*Ktavim*, 2–3, pp. 141–145, 1952. [Hebrew. Abridged English version pp. 39–40.]

Comparative inoculation experiments on Shamouti oranges carried out in Israel in 1938–9 and 1941–2 demonstrated that *Phomopsis* [*Diaporthe*] *citri* and *Phomopsis* sp. [see preceding abstract] from orange buttons, orange twigs, and walnut branches induced rot after a relatively short incubation period. The pathogenicity of *Dothiorella gregaria* [*Botryosphaeria ribis*: loc. cit.; *R.A.M.*, 18, p. 263; 21, p. 524] from lemon and mango twigs closely resembled that of *Diplodia natalensis* [see preceding and following abstracts]. Incidence of both *Phomopsis* and *B. ribis* is, however, low in Israel and their part in the causation of stem-end rot has so far been negligible. *Alternaria citri* [cf. 27, p. 233; 28, p. 393] and *Colletotrichum gloeosporioides* [see preceding abstract], both from oranges, induced stem-end rot only after a prolonged inoculation period, and chiefly on over-ripe, senescent fruit. Their sporadic attacks on other fruits produced brown spots on the skin and local brownish discoloration of the pulp. The part played by these two fungi in causing stem-end rot is small because of their comparatively slight pathogenicity. All inoculations with *Glomerella cingulata* and *Phoma* sp. from orange buttons gave negative results.

Minz (G.). **Further tests on the pathogenicity of Diplodia from various hosts to Citrus fruits.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 190–192, 1953.

In further tests carried out in 1944–5 and 1952–3 at the Division of Plant Pathology, Agricultural Research Station, Rehovot, Israel, of the pathogenicity of 28 isolates of *Diplodia natalensis* from various hosts to orange fruits [*R.A.M.*, 24, p. 189 and preceding and following abstracts] positive inoculations (rotting in five to seven days) on Shamouti were secured with isolates from a sweet lime root (but not from a sweet lime twig), a lemon fruit, and Shamouti twigs affected by blight

(two isolates) and gumming; and on Valencia with isolates from Shamouti twigs affected by die-back (two), blight, and gumming, and from rotting Shamouti (two) and Valencia (four) orange fruits. Sweet limes were rotted by isolates from a sweet lime twig and from Shamouti twig blight.

Positive results were given on fruits of both varieties by isolates from *Acer negundo* root rot, *Casuarina* trunk rot, collar rots of *Cotoneaster*, bitter almond, and apricot, twig or branch rots of persimmon, *Erythrina*, *Ficus nitida*, nectarine, apple, and vine, from leaf stalk of date palm, and from barley seed. Rotting of Valencia orange occurred with an isolate from *Acacia farnesiana*, and of Shamouti with those from *Cupressus pyramidalis* (collar), quince fruit, mango scion, avocado fruit, and rose stem. Grapefruits and lemon fruits were rotted by the isolates from *F. nitida*, lemon fruit, and apple twig.

The pathogenicity of the isolates was independent of their morphological and cultural characters, except for one from date palm and one from wild pear (*Pyrus syriaca*), both non-pathogenic, which differed morphologically from the other isolates.

Nadel-Schiffman (Mina). **Contact transmission of Diplodia rot in Shamouti Orange fruits.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 193–195, 1953.

In experiments at the Division of Plant Pathology, Agricultural Research Station, Rehovot, Israel, rot of Shamouti oranges by *Diplodia natalensis* [see preceding and next abstracts] was transmitted from decayed (inoculated) fruit to sound [*R.A.M.*, 28, p. 63 and preceding abstracts] by contact for 14 to 21 days. The sound fruit developed superficial blemishes of various sizes, though no *Diplodia* could be isolated from them during the first week of their formation. Later, isolates were secured from most of the blemishes on firm peel and from almost all on soft. Blemishes also developed on fruit not in contact with decayed fruit but lying at the bottom of the case where the fruits touched the wood moistened by juice from decayed fruits above. No *Diplodia* could be isolated from these blemishes.

Under normal export conditions with a transit period of three to four weeks there would seem to be little likelihood of contact transmission, as the incubation period of stem-end rot plus the period required for the formation of blemishes and contact transmission amounts to four to six weeks. With longer periods the danger of the spread of *D. natalensis* by contact cannot be neglected.

Littauer (F.) & Gutter (Y.). **Diphenyl-resistant strains of Diplodia.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 185–189, 1953.

Investigations at the Division of Plant Pathology, Agricultural Research Station, Rehovot, Israel, demonstrated that, while diphenyl usually exerts a fungistatic action on the growth of *Diplodia natalensis* [*R.A.M.*, 19, p. 87; 28, p. 285, and preceding and next abstracts], prolonged exposure of cultures to diphenyl sometimes yielded a new growth, isolates from which developed normally at a rate almost equal to that of the original culture. Repeated subculturing did not impair the ability of these isolates to grow in the presence of the chemical. Increasing the dose per dish from 20 to 200 mg. did not affect their growth rate.

These diphenyl-resistant strains induced rotting in Shamouti oranges wrapped in diphenyl-impregnated paper, but were much less pathogenic than strains susceptible to diphenyl.

Fungistat for Oranges.—*Chem. Week*, 73, 6, p. 32, 1953. [Abs. in *Bull. Inst. Pap. Chem.*, 24, 2, pp. 99–100, 1 fig., 1953.]

Some 80 per cent. of all Californian lemons are now shipped, unwrapped, in fibreboard cartons with diphenyl [see preceding abstract] as a disinfectant (against

[unspecified] moulds) applied to a fibreboard collar round the inside of the container or to pads fixed to the top or bottom. Oranges, however, are more susceptible to adverse effect of the chemical on flavour, and a search is in progress at the Citrus Experiment Station, Riverside, for the ideal substitute, concentrating in the first place on the study of hormones, e.g., 2,4-D and 2,4,5-T [*R.A.M.*, 32, p. 479]. A drawback to the use of the otherwise promising terpineol is the fact that it is absorbed by the surrounding fruit and burns it, leaving the centre of the box unprotected.

Orshanskaya (Mme V. N.). Итоги работ по изысканию и применению метода ранней диагностики мальсекко Лимонных деревьев для контроля черенкового материала. [Results of the work on research and application of a method of early diagnosis of mal secco in Lemon trees for the control of grafting material.]—Изв. Акад. Наук СССР [*U.S.S.R. Acad. Sci. News = Bull. Acad. Sci. U.S.S.R.*], *1953*, 6, pp. 90–97, 1953.

At the Central Laboratory for Quarantine of Agricultural Plants, U.S.S.R., the application of either potassium hydroxide or sodium hydroxide [cf. *R.A.M.*, 33, pp. 151, 227] produced the coloration typically denoting infection by *Deuterophoma tracheiphila* in samples of lemon wood [33, p. 292 and next abstract] with latent infection.

Hohryakov (M. K.). Специализация возбудителя инфекционного усыхания Лимонов **(Deuterophoma tracheiphila Petri).** [Specificity of the causal agent of infectious desiccation of Lemon trees (*Deuterophoma tracheiphila* Petri).]—Микробиология [*Microbiology, Moscow*], 21, 2, pp. 210–218, 1952.

Extensive inoculation tests at the Pan-Soviet Scientific Research Institute of Plant Protection, Leningrad, U.S.S.R., with *Deuterophoma tracheiphila* [see preceding abstract] showed that under local conditions the fungus is pathogenic and equally dangerous to sour orange and the hybrid *Citrus junos* × *C. grandis* [*C. maxima*], is intermediate in reaction to Kabo lemons, and less injurious to orange, Meyer lemons, *C. limonelloides* var. *otaitensis*, mandarin (*C. unshiu*), *C. deliciosa*, *C. leiocarpa* var. *praecox*, *Poncirus trifoliata*, and kumquat (*Fortunella margarita*). Various strains of *D. tracheiphila* were found to behave differently in pure culture, differences being apparent in the pigmentation of the mycelium and of the medium (particularly striking on glucose agar), ranging from pale pink and bright orange to dark or olive brown [*R.A.M.*, 29, p. 464], in its ability to form pycnidia and conidia of the *Phialophora* state, and sometimes in the size of the conidia.

Singh (M. P.). **Iron deficiency in Citrus plants and its control.**—*Indian J. Hort.*, 10, 2, pp. 56–58, 3 figs., 1953.

Satisfactory control of an economically important, lime-induced chlorosis due to iron deficiency in *Citrus reticulata* budded on rough lemon was effected at the Government citrus nursery, Nagpur, India [*R.A.M.*, 15, p. 496; 31, p. 541], by spraying with iron ammonium citrate and ferrous sulphate. The disorder was also observed in a milder form on sour lime (*C. aurantiifolia*) and Musambi orange (*C. sinensis*) budded on rough lemon.

Bachy (A.). **Observations préliminaires sur la cercosporiose dite 'rouille' des feuilles du Palmier à huile, due à Cercospora elaeidis Stey.** [Preliminary observations on the cercosporiosis called 'rust' of Oil Palm leaves due to *Cercospora elaeidis* Stey.]—*Oléagineux*, 5, 8–9, pp. 497–499, 1950. [Received April, 1954.]

Cercospora elaeidis [*R.A.M.*, 28, p. 31] was sufficiently serious on oil palm leaves

of nursery plants at the Institut de Recherches pour les Huiles et Oléagineux, Sibiti [French Equatorial Africa], in 1948 to warrant a study of the disease and possible control measures. It has been present since 1942 at least throughout the southern part of the country and also occurs in the Ivory Coast, Cameroons, and Dahomey, but in none of these places was it as severe as at Sibiti.

Infection is initiated at the stoma, around which develops a round yellow to orange spot 0·5 to 1 mm. in diameter surrounding a black pin point. The disseminated conidia cover the lower leaf surface with a yellowish-orange speckle dotted with black. As infection advances the central leaves begin to wither. In general the disease appears to spread from the upper to the lower leaves.

In an experiment in which contiguous seedling plots were set out in February, March, and April, 1944, the last developed the most infection and the February planting the least. One per cent. Bordeaux mixture sprays gave effective control in the nursery, one being applied at the beginning of the dry season and another towards the end, chiefly on seedlings due for transplanting a few days later. Care should be taken to wet the lower leaf surface thoroughly. Treatments should be accompanied by rigorous selection and the removal of unthrifty plants.

The principal factor governing the unusual severity of the disease at Sibiti appears to be climatic, morning mists, night dews, and a high degree of humidity particularly favouring the development and survival of the fungus during the long dry season.

Berry (P. A.) & Abrego (L.). **Insects and diseases affecting some crops in El Salvador.**—*F.A.O. Pl. Prot. Bull.*, 1, 10, pp. 151–153, 1953.

In El Salvador *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 30, p. 36] attacks coffee seedlings at germination or as soon as the plants emerge. With certain conditions of temperature and humidity the fungus spreads very rapidly [17, p. 345] along the row and to adjacent rows, until eventually all the plants may be destroyed. Affected seed-beds should be sprinkled with a fungicide in order to destroy the fungus completely before transplanting.

A root rot (*Fusarium* sp.) [cf. 21, p. 408; 28, p. 564] attacks one- and two-year-old coffee trees. The fungus penetrates the ends of the rootlets and advances towards the main root and stem. The lower leaves turn yellow and fall and the discoloration spreads upwards.

The most serious coffee disease in El Salvador is black root rot (*Rhizoctonia* spp.) [30, p. 36], which has been associated with all samples of root rot injuries. The affected trees undergo a rapid yellowing of the leaves followed by complete defoliation; when they are pulled up the soil adheres to the collar, the intricate twining of the mycelium binding soil and root together. The cambium is discoloured reddish-brown. A few cases of what appears to be *Rosellinia* root rot [cf. 32, p. 480] have been reported.

The chief foliage diseases of coffee locally are *Cercospora coffeicola* [cf. 31, p. 374], anthracnose (*Colletotrichum coffeanum*) [*Glomerella cingulata*: loc. cit.], thread blight (*Pellicularia* [*Corticium*] *koleroga*) [loc. cit.], and *Omphalia flavida* [*Mycena citricolor*: loc. cit.; 32, p. 184]. Of these, the last is the most important; damage is reduced by stripping the diseased leaves by hand, applying copper sprays, and pruning the shade trees.

Parra (J.). **Controles biológicos en suelos de la serie 120. Informe de progreso del proyecto experimental N° QA-10.** [Biological control in soils of series 120. Progress report on experimental project No. QA-10.]—*Bol. inf. Colombia*, 5, 49, pp. 20–24, 2 figs., 1954. [Mimeographed.]

In experiments to determine the effects on bean yields of Casa Blanca coffee (*Coffea arabica*) of adding major and minor elements [cf. *R.A.M.*, 32, p. 20] to pots

containing samples of soil strata taken from typical coffee-growing areas at Caldas, Colombia, increases were obtained by the addition of the major elements in various combinations, but calcium and magnesium in conjunction with the major elements had no significant effect. On the contrary, magnesium reduced yields, the reduction being highly significant without the addition of calcium.

Kublanovskaya (Mme G. M.). Об использовании актиномицетов-антагонистов против фузариозного увядания Хлопчатника. [Concerning the use of actinomycete-antagonists against *Fusarium* wilt of Cotton.]—Микробиология [*Microbiology, Moscow*], 21, 3, pp. 340–347, 1 fig., 1952.

In studies at the Pan-Soviet Scientific Research Institute of Cotton Cultivation, Tashkent, U.S.S.R., of 196 strains of actinomycetes isolated, for the most part, from manure, lucerne rhizosphere, and activated slime and, to a lesser extent, from garden and virgin soils, 95 (48·3 per cent.) were antagonistic to *Fusarium vasinfectum* on cotton [*R.A.M.*, 13, p. 93]. In pot experiments soil was inoculated with cultures of actinomycetes grown on potato clearings. After two months, during which the actinomycetes were allowed to develop, cultures of *F. vasinfectum* on rice were introduced and seeds of the susceptible cotton variety No. 910 sown. The results indicate that three of the eight actinomycete strains tested, namely, Nos. 32, 36, and 606, gave positive results, reducing *F. vasinfectum* infection by 30 to 32 per cent. in non-sterilized soil and 44 to 53 per cent. in sterilized. In addition, these strains had a stimulating effect on cotton growth.

An actinomycete antagonistic to *Verticillium dahliae* [30, p. 270] was also isolated. It suppressed the development of microsclerotia in the soil.

Duddington (C. L.). **Nematode-destroying fungi in agricultural soils.**—*Nature, Lond.*, 173, 4402, pp. 500–501, 1954.

A survey of 49 soil samples from arable land, much of it infested with eelworms, in various parts of England yielded 82 records of nematode-catching fungi of which the most frequent were *Arthrobotrys oligospora* [*R.A.M.*, 32, p. 125] in 21 samples and 'mycelium 186' in 18. The latter is a member of the Zoopagaceae, having non-septate hyphae that capture nematodes by simple adhesion; there are no specialized organs of capture and no visible reproductive organs.

Chowdhury (S.). **A Trichoderma disease of Honey Bees.**—*Curr. Sci.*, 22, 11, p. 348, 1953.

Trichoderma lignorum [*T. viride*] was repeatedly isolated from the bodies of bees [*R.A.M.*, 13, p. 509] which had died suddenly at an apiary near Jorhat, India, in July, 1952. The walls of the digestive tract were riddled with fungus hyphae. Inoculations of healthy bees by means of atomized spore suspensions or spores mixed with a dilute sugar solution feed caused infection and death.

Houston (B. R.) & Knowles (P. F.). **Studies on Fusarium wilt of Flax.**—*Phytopathology*, 43, 9, pp. 491–495, 1 graph, 1953.

A method of inoculation of flax with *Fusarium oxysporum* f. *lini* [*F. lini*], devised for greenhouse use at the University of California, Davis, in connexion with the breeding of wilt-resistant varieties and with fundamental studies on the pathogen and the disease [*R.A.M.*, 33, p. 154], consists in the application of a uniform spore suspension to the seeds and bottom of the furrow after sowing but before covering with soil.

As temperature and soil type can exert a marked effect on wilt, the temperature was maintained at about 25° C. and a sandy-loam soil (pH 5·6) from San Mateo county was used. Precautions were taken to prevent infestation by *Rhizoctonia*

[*Corticium*] *solani*, a prevalent agent of damping-off. Clonal lines of *F. lini* [loc. cit.] fell into five physiologic races, based on their relative pathogenicity to the Punjab 47, Royal, De Anza, Dakota, Crystal, and Redwood varieties.

Lachance (R.-O.) & Perrault (C.). **Antagonisme des microorganismes du sol envers Fusarium oxysporum f. lini agent de la flétrissure du Lin.** [Antagonism of soil micro-organisms to *Fusarium oxysporum* f. *lini*, the agent of Flax wilt.]—*Canad. J. Bot.*, 31, 5, pp. 515–521, 1953. [English abstract.]

At the Division of Botany and Plant Pathology, Ottawa, 19 bacteria and 11 actinomycetes [all unspecified] isolated from various soils in the Lower St. Lawrence district in which flax had been grown [cf. *R.A.M.*, 31, p. 238] were found to be antagonistic *in vitro* to *Fusarium oxysporum* f. *lini* [*F. lini*: 20, p. 534]. Of the actinomycetes six were fungicidal to the spores of the pathogen and five were fungistatic. Six of the bacteria induced swelling of the germ tubes or the production of an appressorium-like structure on agar. In greenhouse experiments all the actinomycetes and 15 bacteria delayed the onset of symptoms on flax seedlings growing in inoculated soil, which sometimes reached a height of 24 ins. before wilting.

Lopez (R.) & Loegering (W. Q.). **Resistencia de variedades de Abacá (Musa textilis Née) a la mancha de la hoja y pérdidas ocasionadas por la enfermedad.** [Resistance of varieties of Abaca (*Musa textilis* Née) to leaf spot and losses caused by the disease.]—*Turrialba*, 3, 4, pp. 159–162, 1 fig., 1 diag., 1953. [English abstract.]

Brown leaf spot of abaca, widely distributed in Central American plantations, produces symptoms similar to those of the banana leaf spots caused by *Helminthosporium torulosum* and *Cordana musae*. The disease first appears as necrotic, black spots 1 to 2 mm. in diameter, enlarging to 20 to 25 cm. long and 8 to 15 wide, with coffee-coloured centres on the upper surface and pale coffee on the lower. The centres are surrounded by a black band 1 to 2 mm. wide and, outside this, by a bright yellow halo. The lesion eventually takes a lenticular form and becomes linear on reaching the leaf margin. To some extent the spots are confined to the interveinal areas, spreading parallel with the veins and widening until they reach the midrib.

Up to 13·7 per cent. of the total leaf area of Bungulanon plants was destroyed; Libuton, Maguindanao, Tangongon, and Putian were less susceptible. In an experiment to determine the effect of reducing the leaf area by defoliating healthy plants, a reduction of 25 per cent. had hardly any effect on growth, while one of 62·5 per cent. reduced growth in height significantly, though the reduction in total growth was small. From this it is concluded that the disease is of only minor importance.

Cumber (R. A.). **Die-back condition of Phormium seedlings used in yellow-leaf investigations.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 3, pp. 270–272, 6 figs., 1953.

Symptoms of a sudden die-back of *Phormium* [*tenax*] seedlings, observed during experimental work on yellow leaf virus [*R.A.M.*, 33, p. 229] at the Entomological Research Station, Foxton, New Zealand, are described. The die-back condition is distinguished from yellow leaf by the absence of translucent tissue with blocked vascular bundles in advance of the root zone in the rhizome, the black (not brown) colour and greater persistence of dead roots, harder nature of the dead rhizome, which may contain cavities, sudden death with less obvious leaf reduction, and rolling of leaves throughout their entire length while still green. In the field there may be a combination of the two conditions. The regional

character of the die-back symptoms and their advance along a definite front indicate a fungus agent.

PATE (J. B.), GANGSTAD (E. O.), JOYNER (J. F.), & SEALE (C. C.). **Kenaf in South Florida.**—*Gdn J.N.Y. bot. Gdn*, 4, 2, pp. 40–41, 5 figs., 1954.

Pure-line selection in the Salvadorian variety of kenaf (*Hibiscus cannabinus*) has led to the development of lines resistant to *Colletotrichum hibisci* in Florida [*R.A.M.*, 32, p. 79].

BEAUMONT (A.). **Diseases of Aquilegias.**—*Gdnrs' Chron.*, Ser. 3, 135, 3507, p. 120, 1954.

Several diseases are reported on garden columbine (*Aquilegia vulgaris* and other species) in Great Britain. Leaf spot (*Actinonema aquilegiae*) causes small, irregular, whitish or light brown spots which often become brittle and disappear, leaving shot holes. Spores are formed in pustules on the upper surface of the spots. Rust (*Puccinia agrostidis*) [cf. *R.A.M.*, 20, p. 596] is very local on wild but rare on garden columbines. Cucumber mosaic virus [cf. 18, pp. 509, 803] is common on garden plants; they become stunted, do not flower, and the leaves are conspicuously mottled. Tomato spotted wilt [cf. 14, p. 129] is much less common.

Diseases of Camellia.—*Gdnrs' Chron.*, Ser. 3, 135, 3505, p. 102, 1954.

Mentioned among the diseases occurring on *Camellia* (*C. japonica*) in Great Britain are two leaf spots, *Pestalozzia guepini* [cf. *R.A.M.*, 26, p. 330], which is very common, and *Phyllosticta camelliae* [cf. 27, p. 126].

THOMAS (W. D.) & DICKENS (L. E.). **Carnation pimple.**—*Plant Dis. Reptr*, 37, 12, pp. 634–635, 1 fig., 1953. [Multilithed.]

Pimple-like spots 1 mm. in diameter were observed on the leaves and stems of carnations [? in Colorado], first appearing on the upper parts of the plant, near the base of the leaf on the ventral side and later nearer the tips. Leaves of severely infected plants became shrivelled. A bacterium isolated from the spots at the Colorado Agricultural Experiment Station is considered to be a new variety of *Xanthomonas oryzae*. It was pathogenic in inoculation experiments to White Patrician and Miller's Yellow carnations and to *Dianthus barbatus*, symptoms appearing four days after soil inoculation and four to eight days after spray treatment of the foliage with the bacterial suspension. The bacterium was recovered in all cases. The new variety differs from *X. oryzae* in that it does not produce acid from glucose, lactose, and sucrose.

HOLTZMANN (O. V.) & THOMAS (W. D.). **Studies on the wilt of Carnations caused by Pseudomonas caryophylli.**—Abs. in *Phytopathology*, 43, 10, p. 587, 1953.

In preliminary tests [? at the Colorado Agricultural Experiment Station] carnation cuttings wilted when placed in a filtrate of a suspension of *Pseudomonas caryophylli* [*R.A.M.*, 33, p. 230]. In naturally diseased plants there was partial plugging and lysis of the xylem vessels, infection extending into the upper parts of a branch and into the leaves. No wilting developed in cuttings suspended in bacterial filtrates from which proteins and other large molecular compounds were removed. Significant reductions in the concentration of some free amino acids in diseased as compared with healthy plants were disclosed by paper-partition chromatography. There was an increase in fructose in infected plants, but no change in the glucose level. It appears from these observations that a combination of factors, rather than a single cause, is concerned in the initiation of bacterial wilt.

Burkholder (W. R.), McFadden (L. A.), & Dimock (E. W.). **A bacterial blight of Chrysanthemums.**—*Phytopathology*, 43, 9, pp. 522–526, 3 figs., 1953.

Studies on a hitherto undescribed disease affecting greenhouse stocks of *Chrysanthemum morifolium* in New York (1950), Massachusetts, Florida, North Carolina, Ohio, Connecticut, and Pennsylvania (1951–2) are reported from the Department of Plant Pathology, Cornell University, Ithaca, New York. The red to red-brown lesions produced on the stems and sometimes on the roots expand rapidly in succulent tissues under conditions of high temperature (80° F. and upwards) and humidity. The pathogen was readily isolated from diseased plants and determined by its morphological, cultural, and physiological characters as a new species of *Erwinia* for which the name of *E. chrysanthemi* is proposed. In a 24-hour-old culture on beef-extract-peptone agar the average dimensions of the straight rod with rounded ends, occurring singly or in pairs, were 2·1 by 0·7 μ. The cultural differences between the chrysanthemum pathogen, *E. atroseptica*, and *E. carotovora* [*R.A.M.*, 29, p. 276] are presented in tabular form. *E. chrysanthemi* resembles *E. carotovora* (and differs from *E. atroseptica*) in utilizing ethyl alcohol, dulcitol, and sodium malonate, hippurate, urate, and tartrate. There is delayed utilization of lactose; triple sugar agar is turned yellow, then red, and brom thymol blue in sucrose is decolorized. On desoxycholate agar the colonies are yellow. Good growth is made in Fermi's solution. The pathogen is methyl red-negative and positive to the Voges-Proskauer test. On endo agar the colonies were pink. No growth was made in 5 per cent. sodium chloride solution and the maximum growth temperature was 37° to 41° C. Over 50 varieties of *C. morifolium* were more or less susceptible in inoculation tests with *E. chrysanthemi*, which was also pathogenic to *C. maximum*, *C. parthenium*, *C. rubellum*, potato, tomato, onion, cabbage, lettuce, celery, carrot, and radish. *E. atroseptica*, *E. carotovora*, and *E.c.* f.sp. *parthenii* were innocuous to chrysanthemum.

Mention is made of three previously reported bacterial blights of chrysanthemum, *Pseudomonas solanacearum* [3, p. 261], one in England (unnamed) [9, p. 37], and *P. syringae* in Germany, all of which differ in some respects from the foregoing.

Shuttleworth (F. S.). **Studies of sub-tropical rusts. I. Prospodium transformans.**—*Mycologia*, 45, 3, pp. 437–449, 9 figs., 1953.

Prospodium transformans causes hypertrophied areas on the leaves and large galls on the stems, petioles, and fruits of *Tecoma stans* in southern Florida and the Bahamas. Internal sori are often formed within the galls. The species produces only pycnia and teleutosori. The teleutospores germinate directly on maturation, the optimum temperature range for germination being 18° to 21° C. Inoculations of young potted plants of *T. stans* with teleutospore suspensions usually gave pycnia and teleutosori in 18 to 21 days, but no galls developed even after five months. Nuclear details of the life cycle are given. The mycelium is uninucleate and becomes binucleate in the young teleutospore.

Sampson (R. E.) & Ludwig (R. A.). **The effectiveness of certain fungicides against Botrytis tulipae (Lib.) Lind.**—*Canad. J. Bot.*, 31, 5, pp. 531–536, 1 pl., 1 graph, 1953.

When *Botrytis tulipae* was cultured at the Science Service Laboratory, London, Ontario, in moist chambers on freshly cut tulip tissues micro- and macroconidia were produced in eight days on the petals and in 11 days on the leaves. However, since the macroconidia were not sufficiently numerous for a fungicide assay by the slide germination technique [*R.A.M.*, 33, p. 243] a modification of Forsberg's thread method [28, p. 400] was employed. Pieces of thread infested from 12-day-old cultures of *B. tulipae* were soaked in aqueous fungicide solutions, planted, ten

to a plate, on potato dextrose agar, and incubated for two days at room temperature, the number which failed to produce colonies then being counted. Thiram and ferbam were effective *in vitro* at lower concentrations than chloranil or vancide 51. None of the fungicides tested, however, controlled *B. tulipae* when applied to infected tulip bulbs [32, p. 613], probably owing to their inability to penetrate the outermost white scale.

Ludbrook (W. V.), Brockwell (J.), & Riceman (D. S.). **Barepatch disease and associated problems in subterranean Clover pastures in South Australia.**—*Aust. J. agric. Res.*, 4, 4, pp. 403–414, 3 pl., 1953.

In March, 1950, the roots of plants in extensive bare patches in a nine-year-old pasture of subterranean clover (*Trifolium subterraneum*) near Keith, Coonalpyn Downs, South Australia [*R.A.M.*, 32, p. 235], were almost completely retarded and extensively rotted. The foliage of infected seedlings became purplish-brown. When infection occurred late the plants survived the winter, made normal early spring growth, and then collapsed without showing any characteristic symptoms. The leaves of *Bromus* spp. in the affected patches developed a purplish-red tinge two to three weeks after germination, and the root systems were much reduced by a fungal rot with yellowish-brown lesions. The plants survived longer than subterranean clover but made no appreciable growth.

Affected roots of subterranean clover bore various fungi but in pot inoculation tests only *Rhizoctonia* [*Corticium*] *solani* [33, p. 208] produced symptoms on subterranean clover and brome grass comparable with those observed in nature. There was marked variation in pathogenicity between different isolates. In a field experiment the plants in all the inoculated plots developed characteristic symptoms, and *C. solani* was consistently isolated from the roots.

Landholders reported that affected areas in pastures corresponded to the approximate sites of 'purple patch' in cereal crops [12, p. 159] grown in earlier seasons. Oats and wheat grown in bare patches in clover fields and clover plants sown in 'purple patch' areas in volunteer cereal stands became affected. It is concluded that the bare-patch of pastures studied is caused by *C. solani*, the strain responsible being identical with that causing purple patch of cereals.

In large unthrifty areas [33, p. 208] subterranean clover plants were stunted and the foliage displayed a bluish or grey-green tinge. Fungal rotting was largely confined to the hypocotyl and the top inch of the tap root, which turned reddish-brown. Root elongation was normal, but occasionally the root tips were slightly rotted. Associated grasses were somewhat stunted and the leaf tips bluish. The stunting persisted but the discoloration disappeared. Rotting of the leaf sheaths below ground level was often serious. Many affected plants survived in a weakened condition and the unthriftiness did not usually recur on the same sites.

In greenhouse pathogenicity tests of the numerous soil-inhabiting fungi isolated *C. praticola* [loc. cit.] alone produced symptoms comparable with those observed in nature. In field plots inoculated with *C. praticola* symptoms developed comparable with those in naturally occurring unthrifty areas and the fungus was re-isolated from the affected plants. However, a large proportion of the stunted plants later appeared almost normal. No such recovery occurred in naturally infected pasture.

Graham (J. H.). **A disease of Birdsfoot Trefoil caused by a new species of Stemphylium.**—*Phytopathology*, 43, 10, pp. 577–579, 3 figs., 1953.

The fungus responsible for a hitherto unreported disease of *Lotus corniculatus*, first observed in New York State in 1951, is named *Stemphylium loti* n.sp. It produces on the leaves reddish-brown, slightly depressed, circular lesions,

which expand to 5 mm. in diameter, turning darker and sometimes becoming concentrically zonate, with paler centres. A single lesion usually suffices to cause premature defoliation. Copper-coloured cankers, ranging from dots to boat-shaped areas 25 mm. in length, develop on the stems. Under humid conditions their ash-grey centres become partially covered with black spore masses. Young stems may be girdled and killed back as far as the crown. Irregular, dark-brown blotches are formed on green and ripening pods, and the seed is frequently shrivelled and discoloured.

S. loti sporulates freely on diseased and dead tissue in nature. On overwintered stems clusters of mostly simple, golden- to dark-brown, septate conidiophores, 27 to 66 by 4 to 10 (average 49 by 9) μ, arise from black stromatic bodies, 159 to 424 by 100 to 212 μ, as well as directly from the epidermis. The olive-brown, muriform conidia, borne singly, are commonly spherical to rectangular, with a prominent central constriction, and measure 21 to 37 by 14 to 33 (30 by 21) μ. Growth on potato dextrose agar is scanty. On oatmeal agar the colonies are drab to dark greyish-olive, powdery, appressed, with a wide, white margin, darkening later, and zones of paler grey mycelium developing in the centre after eight to ten days. Sporulation is profuse on both media. On sterile stems of lucerne and *L. corniculatus* little mycelium is produced but conidia are abundant, with many stromatic bodies, 30 to 45 μ in diameter, at the stem bases in the water.

S. loti differs from the conidial state of *Pleospora herbarum* [see next abstract] on the same host [*R.A.M.*, 25, p. 579] primarily in the smooth or only slightly rugose nature of the conidial wall, apparent absence of a sexual stage, and restriction to species of *Lotus* as shown by inoculation experiments. There is some resemblance between *S. loti* and *S. sarciniforme* on red clover [11, p. 377; 18, p. 141; 32, p. 563], but the conidiophores and conidia of *S. loti* are paler, never becoming fuliginous or black, it produces stromatic bodies which are absent from *S. sarciniforme*, and each is limited to one host genus.

The optimum temperature for mycelial growth of *S. loti* in culture lay between 24° and 28° C., for sporulation from 19° to 25°, and for germination from 21° to 28°. No development occurred at 2° or 37°. On the other hand, *S. sarciniforme* made some growth on potato dextrose agar at both these points, while the optimum was about 22°.

The pathogen is prevalent throughout the growing season in the north-eastern States, damage being particularly severe during rainy periods in the summer. In inoculation chambers held at 18°, 22°, 26°, and 29°, at 100 per cent. relative humidity, and under about 500 foot-candles for 16 hours daily, infection was most virulent at 26° and moderate at the other temperatures. *P. herbarum* and *S. sarciniforme* were unable to infect *L. corniculatus*. *L. scoparius* and *L. tenuis* were susceptible to *S. loti*, which was somewhat less injurious to three selections of *L. uliginosus*. Of six varieties, two selections (from Italy), and three introductions of *L. corniculatus*, only Granger showed a measure of resistance.

S. loti overwinters on host tissue and in association with seed, the stromatic bodies developing on dead stems in the late autumn and winter and producing conidiophores and conidia in the spring. The percentage of infected seed was usually less than 1, though in one New York sample it reached 4. Seedlings may be killed by the fungus growing from the cotyledons into the stem.

Nelson (R. R.) & Kernkamp (M. F.). **The conidial stage of Pseudoplea briosiana on Alfalfa.**—*Phytopathology*, 43, 10, pp. 584–585, 1953.

At the Department of Plant Pathology, University Farm, St. Paul, Minnesota, several monoconidial isolates agreeing completely with the description of *Stemphylium botryosum* [*Pleospora herbarum*: see preceding abstract] gave rise both on synthetic media and on lucerne leaves to *Pseudoplea briosiana*, for which this is

the first report of a conidial state. The name now generally accepted for the pathogen of clover and lucerne is *P. trifolii* (or *Sphaerulina trifolii*, syn. *Pleosphaerulina briosiana*, and *Pseudoplea briosiana*) [cf. *R.A.M.*, 22, p. 153; 31, p. 354]. The authors, however, advance arguments, based on cultural and inoculation experiments and a study of the *Stemphylium* isolates, why the names *P. trifolii* and *P. briosiana* should be retained and distinguished from one another and from *Pleospora herbarum* [32, p. 343]. They suggest that the taxonomic positions of the last-named and *S. botryosum* are uncertain and that the latter actually comprises two species with morphologically similar conidial but distinct ascigerous states.

Erwin (D. C.). **Phytophthora root rot of Alfalfa.**—Abs. in *Phytopathology*, 43, 10, p. 586, 1953.

Phytophthora (?) *cryptogea* was isolated from lucerne plants with a hitherto undescribed root rot in four counties of California. The upper leaves of severely infected plants were usually yellow. A watersoaked, reddish-brown area appeared on the tap-root and later extended through the bark and into the wood, ultimately involving the entire root. The woody tissue above and below the brown lesion turned yellow. A root rot identical with that observed in the field developed in healthy lucerne plants within 18 days of inoculation with the fungus, which was recovered from the diseased tissues.

Mead (H. W.). **Studies on black stem of Alfalfa caused by Ascochyta imperfecta Peck. I. Seed and seedling phases of the disease.**—*Canad. J. agric. Sci.*, 33, 5, pp. 500–505, 2 pl., 1953.

In 1946 and 1947 *Ascochyta imperfecta* was present as mycelium on the outer surface of the seed-coat of over 75 per cent. of the samples of lucerne seed [*R.A.M.*, 32, pp. 486, 542; 33, p. 234] from northern Saskatchewan, average infection being 12 and 10·9 per cent. in the two years, respectively. Seed inoculated at the Laboratory of Plant Pathology, Saskatoon, Saskatchewan, with spores of *A. imperfecta* suffered a 90 per cent. seedling mortality under moist conditions in *in vitro* tests. The average yield of *A. imperfecta* isolates from naturally infected seed (23 per cent.) was reduced to less than one per cent. by treatment with arasan, semesan, and spergon (all at 0·25 per cent. seed weight) and ceresan (0·09 per cent.). Sections of diseased seedlings revealed a mass invasion of the cortical tissues of the hypocotyl, which had disintegrated. The fungus was massed in walled, pycnidium-like structures on the dead tissues, while the mesophyll of the cotyledons was ramified by mycelium. Infection of this area killed the growing point, thus preventing further growth of the infected seedlings.

Palti (J.) & Ellern (S.). **Control of the powdery mildew of Vetches by aircraft sulphuring.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 216–218, 1953.

In 1950 seed crops of purple vetch (*Vicia atropurpurea*) in Upper and Lower Galilee, the Plain of Esdraelon, and the Coastal Plain, Israel, were severely damaged by powdery mildew (*Oidium erysiphoides*) [cf. *R.A.M.*, 16, p. 614; 29, p. 457]. As ground conditions in early spring render the application of fungicides from the ground very difficult, aeroplane dusting was tried at Gan Shmuel settlement, Central Coastal Plain. Sulphur was applied at the rate of 35 lb. per acre on 7th and 17th May. On 25th May 80 per cent. of the undusted plants were without green leaves, as against 7 per cent. for the dusted, 80 per cent. of the treated leaves having no mildew.

The first treatment should be given when disease symptoms appear. Rain in April or May appears to favour infection and simultaneously washes off the sulphur, necessitating re-treatment.

Fischer (G. W.). **Induced hybridization in graminicolous smut fungi. II. Ustilago striiformis × U. bullata.**—*Phytopathology*, 43, 10, pp. 547–550, 2 figs., 1953.

This is an expanded account of studies at the State College of Washington on hybridization between *Ustilago striiformis* f. *hordei* and *U. bullata*, a preliminary note on which has already appeared [*R.A.M.*, 27, p. 283; cf. also 31, p. 60; 33, p. 31].

Barker (B. T. P.). **Cider Apple production.**—*Bull. Minist. Agric., Lond.*, 104, iv+ 64 pp., 8 pl., 1954.

The second edition of this bulletin brings a full account of the cider apple industry up to date. Details of cider apple and perry pear varieties, with their susceptibility to pests and diseases, and methods and economics of control, are included.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, 1, 10, pp. 154–157, 1953.

E. Gram reports that, as rubbery wood virus [*R.A.M.*, 33, p. 89] is increasing in certain apple varieties in Denmark [31, p. 172], the National Committee for Propagation and Sanitary Inspection of Horticultural Plants has invited nurseries specializing in the production of apple rootstocks to send one layer from each of their mother plants to the experimental station, Blangstedgaard. Here the layers will be budded to a highly susceptible variety. Infected mother plants are destroyed when symptoms appear.

A collection of selected typical and healthy mother trees of important apple, pear, and plum varieties has been established by the National Committee in co-operation with the Nurserymen's Association. Grafting and budding material will be provided from this collection for the detection of virus diseases of fruit trees.

Jeffery (Margaret W.). **Preliminary investigations into the life cycle of Venturia inaequalis (Cooke) Wint. in South Australia.**—*Aust. J. agric. Res.*, 4, 4, pp. 415–422, 2 pl., 1953.

In preliminary investigations of the life-cycle of *Venturia inaequalis* in South Australia [*R.A.M.*, 24, p. 421; 27, p. 568], with special reference to the sources of primary infection, no twig infection was recorded during 1950. No superficial conidia remained viable after July, from which it was concluded that either they do not overwinter to provide a source of infection in spring, or the number likely to do so is negligible. Infection of dormant bud scales was first noted locally on 15th May, 1950, but the lesions did not develop sufficiently to infect the flowers and foliage even after bud burst, perhaps because the rainfall during the first four months of the year was inadequate. As, however, bud-scale infection is a potential source of inoculum in the spring, further investigation of this point is desirable.

No material ascospore discharge occurred in 1950 until mid-September; emission was heavy from mid-October until late November, when the readings were discontinued. The first foliage infection at Paracombe, where the observations were made, probably corresponded with this heavy discharge, as the first foliage lesions had reached macroscopic size by 15th November. It is possible that late-maturing perithecia could give a significant ascospore emission even after the end of November, and if so this might be important in causing infection of leader shoots, a feature often seen in South Australia after December rains, but emission would have to extend into January to play any part in late summer spot infection, and at present there is no evidence to support this possibility.

Smith (H. C.). **Collar rot of Apple trees in Essex.**—*Plant Path.*, 2, 3, pp. 85–86, 1953.

In June, 1952, apple trees in an orchard at South Benfleet, Essex, were found to be affected by a long established collar rot due to *Phytophthora cactorum* [cf.

R.A.M., 15, p. 555; 31, p. 20]. The grower stated that one or more leaders gradually declined and bore small, highly coloured leaves and fruit, which usually fell prematurely. Affected trees occasionally succumbed in a single season, though they sometimes lingered on for years. The bark at the base of the trunk and on the crown roots displayed irregular areas of rotting. Later these spread round the trunk, upwards towards the main leaders, and downwards along the crown roots. Extensive trunk lesions occurred only on Cox's Orange Pippin, but root infection was present on a number of varieties. The rotted areas were not immediately perceptible to the naked eye, but underneath the recently invaded bark the cortex was reddish-brown. The tissues later turned black and became soft and rotten, especially when below ground.

Attempts to isolate *P. cactorum* from old infections and roots were unsuccessful, but it was obtained from the collar of a Cox. This isolate grew very slowly at 30° C. and resembled in appearance and growth rate isolates causing trunk canker of apple trees in New Zealand [loc. cit.].

Wound inoculations at Cambridge of trunks and branches of Cox and Bramley's Seedling with *P. cactorum* from Cox and four other sources and with three isolates of *P. cactorum* var. *applanata* [cf. 31, p. 434] showed that trunk bark was more susceptible than branch bark, and Cox more susceptible to *P. cactorum* than Bramley. The isolate of *P. cactorum* from Essex was comparable in pathogenicity with that from a Cox in New Zealand, which had been the most highly pathogenic of nine isolates tested there. An isolate from Jonathan roots in New Zealand was of medium pathogenicity. The remaining isolates of *P. cactorum* and all those of *P. cactorum* var. *applanata* were only slightly pathogenic, the latter being probably more so to Bramley than to Cox.

Hall (E. G.), Sykes (S. M.), & Trout (S. A.). **Effects of skin coatings on the behaviour of Apples in storage. III. Cool storage investigations.**—*Aust. J. agric. Res.*, 4, 4, pp. 365–383, 1 pl., 1 graph, 1953.

In further experiments carried out mostly in New South Wales from 1941 to 1946 on the effects of skin coatings on apples kept in cool storage [*R.A.M.*, 33, p. 236] 7 to 10 per cent. solutions of castor oil and shellac (C.O.S.) generally reduced wastage and delayed ripening more than oil emulsions, and these more than wax emulsions. The last-named however, controlled shrivelling well and were preferred for Jonathans. With Granny Smith a 10 to 12½ per cent. emulsion of mixed peanut oil and medicinal paraffin was nearly as good as C.O.S.; it merits commercial trial with fruit wrapped after coating. The coatings should increase by 25 to 30 per cent. the commercial cool-storage life of some varieties, including Granny Smith, Jonathan, Democrat, Rome Beauty, and Sturmer Pippin.

C.O.S. and oil emulsions partially controlled superficial scald [loc. cit.], but less effectively than good-quality oiled wraps. Better control resulted when the treated fruit was wrapped in plain paper. Waxing did not control scald. All coatings much reduced Jonathan spot and senescent disorders [loc. cit.], such as lenticel scald, late scald, mealy breakdown, and core flush, the effect, as with Jonathan spot, being proportional to the retardation of ripening. Only C.O.S. reduced rotting; emulsions frequently increased it.

Skin blemishes, internal disorders, and off-flavours due to coating were conspicuous features only of fruit kept at 70° F. or above before or after storage, and these defects were markedly reduced by using less concentrated coatings and by wrapping. Wax coatings of not over 10 per cent. concentration did not produce off-flavours, and if they could be made with non-injurious emulsifying agents would be of valuable assistance in cool storage.

In the cooler parts of Australia coated fruit of late varieties could safely be left for some weeks before cool storage. Late varieties, likely to be taken from storage

when temperatures exceed 70°, would require weaker coatings, e.g., 6 to 7 per cent. C.O.S. or 8 per cent. oil emulsion. Such coatings would control waste and retard ripening less effectively, but, particularly with wrapped fruit, should cause little injury at the higher temperatures.

In spite of the many advantages of coating apples before cool storage the authors do not consider it possible at present to recommend with confidence the use of any skin coating as a reliable commercial procedure. Further trials with some of the new emulsifying materials incorporating a fungicide may, however, lead to the production of a coating of considerable practical value.

Zobrist (L.) & Hoffmann (E.). **Die Bekämpfung des Zwetschgenrostes mit Zineb.** [The control of Plum rust with zineb.]—*Phytopath. Z.*, 21, 1, pp. 79–82, 1 fig., 1953. [English summary.]

In experiments near Zürich, Switzerland, in 1951 and 1952, plum rust (*Tranzschelia* [*Puccinia*] *pruni-spinosae*) [*R.A.M.*, 33, p. 36] was effectively combated on fruit-bearing trees by one application of 0·2 per cent. zineb in mid-June, the protective effect of the treatment on the foliage persisting until the first frosts. A second application in mid-July is indicated for vigorously growing young trees.

Ashour (W. E.) & Allam (M. E.). **Shot-hole disease of stone fruits caused by Clasterosporium carpophilum.**—*Nature, Lond.*, 173, 4401, p. 456, 1954.

At the Faculty of Agriculture, Shebin El Kom, isolation tests demonstrated that *Clasterosporium carpophilum* [C.M.I. map No. 188] is viable in peach leaf lesions in Egypt from March to September. Successful results were obtained in pathogenicity trials by inoculating young peach seedlings with a spore suspension; by pricking the leaves clear symptoms were secured within a week. Severe infection started in March, particularly after a wet winter, increased in severity until May, was reduced slightly in succeeding months, and then rose gradually from September to the end of the season.

Wenzl (H.) & Kahl (E.). **Versuche über die biologische Prüfung von Schwefelpräparaten an Monilia-Mumien.** [Experiments on the biological assay of sulphur preparations on *Monilia* mummies.]—*PflSchBer.*, 11, 3–4, pp. 40–44, 1953. [English summary.]

The results of tests at the Plant Protection Institute, Vienna, to determine the comparative efficiency of various concentrations of lime-sulphur, barium sulphide, and the wettable sulphurs thiovit and S805 A in the control of *Monilia* [*Sclerotinia*] *laxa* on apricot [*R.A.M.*, 30, p. 616] showed that dosages with equivalent sulphur or polysulphide contents are about equally effective in the prevention of sporodochial development on mummified fruits.

Wade (G. C.). **Brown rot of Apricot investigations. Value of tetra-methyl thiuram disulphide and a potassium fertilizer for control.** *Tasm. J. Agric.*, 23, 3, pp. 241–246, 1 fig., 1952.

Results obtained during the 1951–2 season confirmed that thiram is a safe and effective spray for the control of apricot brown rot (*Sclerotinia fructicola*) in Tasmania [*R.A.M.*, 31, p. 335] and demonstrated that an application at petal fall, in addition to cover sprays given at the commencement of ripening, reduced rot incidence from 20·4 to 9·6 per cent. An additional spray at full bloom gave no further improvement. Following evidence that the potassium level of the trees influenced susceptibility, potassium chloride was applied as a soil dressing at 4 cwt. per acre or as a 1 per cent. spray and it reduced brown rot from 40·46 to

24·83 and 18·73 per cent., respectively. Four applications at monthly intervals gave no better protection than a single spray a month before picking.

Hildebrand (E. M.). **Fruit virus diseases in New York in retrospect.**—*Plant Dis. Reptr, Suppl.* 222, pp. 185–223, 40 figs., 1953. [Multilithed.]

Descriptions are given of the history, incidence, symptoms, and control of virus diseases of stone fruits, cherry in particular [cf. *R.A.M.*, 32, p. 681], occurring in New York State. Most of the information (with 84 references), which is a résumé of work in which the writer participated from 1935 to 1944, has been noticed in this *Review*.

Fischer (R.). **Über Cylindrosporium-Krankheiten an Prunusarten und deren Vorkommen in Österreich.** [On *Cylindrosporium* diseases of *Prunus* species and their occurrence in Austria.]—*PflSchBer.*, 11, 7–8, pp. 113–118, 2 figs., 1953. [English summary.]

Attention is drawn to the extraordinary prevalence of *Cylindrosporium padi* on European bird cherry (*Prunus padus*) in Austria during 1953 [cf. *R.A.M.*, 33, p. 206], when it was also observed for the first time on sweet cherry in Upper and Lower Austria and Carinthia and on prune-plum in Upper Austria. The relationship of the fungus to *Coccomyces hiemalis* [C.M.I. map No. 58] requires further clarification.

Stace-Smith (R.), Wooley (P. H.), & Vaughan (E. K.). **A new disease of cultivated Blueberry.**—Abs. in *Phytopathology*, 43, 10, p. 589, 1953.

A species of *Pseudomonas* was shown to be the agent of a serious stem canker of blueberry (*Vaccinium australe*) which has been under observation in western Oregon during the past five years. The initial symptom, usually appearing in January or February, is a watersoaking which rapidly changes into well-defined reddish-brown or black cankers extending from a few mm. to the entire length of the cane. The only canes affected are those produced the previous season. All the buds in the cankered area are killed and the stems may be girdled. Both field plants and cuttings in the propagating bed are liable to infection. The Jersey, Atlantic, Scammel, Coville, Evelyn, and N51G varieties appear to sustain the heaviest damage, while Rubel, Pioneer, and Burlington are seldom affected, and the *V. australe* × *V. lamarckii* hybrids Weymouth, June, and Rancocas are highly resistant.

McKeen (W. E.). **Loganberry rootrot on Vancouver Island.**—Abs. in *Phytopathology*, 43, 10, p. 588, 1953.

The last few years have been marked by a continuous decline of loganberry plantations on Vancouver Island, Canada. Early spring development appears normal, but there is a reduction in the number of shoots emerging from the old crown, especially in the lower-lying parts of the field. New shoots may begin to emerge from the soil, but they turn brown and necrotic on the sudden cessation of growth. As the fruits approach maturity a physiological drought and starvation of the plants appears to occur. The crown and root system of unhealthy plants removed at midsummer were not necrotic, but new, white, sound roots were confined to a relatively small area. Many roots from loganberry tips planted in soil from the affected areas of the field were necrotic and often entirely decomposed. The disease was prevalent on tips removed from the field during January and February, 1953. Many necrotic roots harboured a species of *Phytophthora* difficult to isolate because of the presence of a *Pythium* and a nematode of the genus *Paratylenchus*.

Stover (R. H.). **The effect of soil moisture on the growth and survival of Fusarium oxysporum f. cubense in the laboratory.**—*Phytopathology*, 43, 9, pp. 499–504, 4 graphs, 1953.

In further experimental work at the United Fruit Company Tropical Research Department, La Lima, Honduras [*R.A.M.*, 33, p. 307 and below, p. 380], 25 per cent. saturation was determined to be the optimum moisture-level for the growth and survival in non-sterile soils of *Fusarium oxysporum* f. *cubense* [loc. cit.]. As the moisture content was raised to saturation the fungus population declined. At saturation point survival was longer in sandy loam than in loam and reached a maximum in sterile and previously submerged soil. In sterilized soil the differences in growth and survival at 25, 50, and 75 per cent. saturation were less than in non-sterile. The effect of submersion of soil under water for four months was comparable with, but slighter than, that of sterilization. In previously submerged soil fungus growth for a period of 200 days at 25, 50, and 75 per cent. saturation was greater than in non-sterile at 25 per cent. and so was survival.

Fluctuating moisture levels out-of-doors promoted the development of other soil fungi, e.g., *Aspergillus* and *Penicillium* spp., at the expense of *F. o.* f. *cubense*. The last-named colonized dead banana roots for a period of at least nine months at moisture levels up to near saturation, the fungus being considerably more abundant in semi-decayed roots than in the surrounding soil.

Malan (E. F.). **The production of Cavendish Bananas.**—*Fmg in S. Afr.*, 28, 332, pp. 365–369, 5 figs., 1953.

The author describes the cultural practices to be used when growing bananas, with particular reference to *Musa cavendishii*, the most popular commercial variety grown in Transvaal, Natal, and Eastern Cape Province. It is comparatively free from diseases and on account of its resistance to Panama disease (*Fusarium oxysporum* var. *cubense*) [C.M.I. map No. 31; *R.A.M.*, 32, p. 324], not known to be present in the Union, is preferred to Gros Michel [32, p. 200]. Root rot [unspecified] occurs as a result of excessively moist conditions on poorly-drained soil; it may be prevented to some extent by judicious irrigation. Cigar-end rot (*Stachylidium* [*Verticillium*] *theobromae*) [C.M.I. map No. 146] may become severe in autumn during excessively warm, moist conditions. It is practically eliminated by removing the perianth early, aerating the plantations properly, and dusting the bunches with a copper-containing fungicide.

Melville (F.). **The Passion Fruit. Its cultivation in Western Australia.**—*J. Agric. W. Aust.*, Ser. 3, 1, 6, pp. 737–747, 7 figs., 1952.

This popular article includes a brief note on the symptoms and control of passion vine brown spot [*Alternaria passiflorae*: *R.A.M.*, 19, p. 294; 27, p. 116] and *Sclerotinia* stem rot [3, p. 527] in Western Australia. In certain areas copper, zinc, and manganese deficiencies may occur, the symptoms usually including, in addition to unsatisfactory growth, a yellow interveinal mottling.

Ciferri (R.). **Disorders of fruit trees due to boron deficiency and other causes in northern Italy.**—*F.A.O. Pl. Prot. Bull.*, 1, 11, pp. 169–170, 1953.

The main cause of the disorders of olive trees and deciduous fruits in the Liguria, Veneto, and Trentino–Alto Adige (Tyrol) areas is boron deficiency [cf. *R.A.M.*, 23, p. 69; 32, p. 84], the symptoms of which are frequently obscured by those of potassium deficiency, which is very common. A number of cases reported as 'brusca' disease [cf. 4, p. 358] of olive are probably due to boron or other mineral deficiency. The symptoms of boron deficiency on olive vary widely with the ecological conditions, but include sharply defined chlorosis in the distal half or

third of the leaf. The foliage is sparse, poorly developed, and frequently rosetted. New growth is dwarfed, fasciculate, but profuse. The larger branches and trunk are blistered and the phloem is brown and necrotic. Productivity is greatly reduced. Affected trees recover within one year of treatment (1 lb. borax per tree to the soil or injection of boric acid into the trunk).

Acute boron deficiency in apples [loc. cit.] causes the fruits to be deformed, pitted, cracked, and roughened, with a brown, corky core. In chronic boron deficiency there is atrophy or death of buds, deformation and shedding of young leaves, phloem necrosis, and blistering of the branches. The twigs die back and the fibro-vascular bundles are discoloured. Later a foliar rosette condition develops. On the lower part of the tree the leaves appear almost normal, but scattered brown spots are present in the phloem. Affected trees cease production from the time the symptoms appear and die in three or four years. Complete recovery follows a soil application of 1 lb. borax per tree, made in the early stages.

Insecticides, fungicides, weed killers.—*Agric. Chemic.*, 7, 12, pp. 42–44, 97, 99, 1952.

At the New York State Insecticide-Fungicide and Pesticide Application Equipment Conference, held at Ithaca, New York, from 11th to 13th November, 1952, it was demonstrated that diaphragm type pumps appear to retain their efficiency longer than other types. Wettable powders wear out pumps rapidly.

The greater problem of registering a product nowadays as compared with a few years ago is emphasized. The nature and amount of residue remaining on crops at harvest must be determined [see next abstract], requiring a high degree of accuracy in testing.

Dr. W. D. Mills reported from Cornell University that in limited experiments combination with parathion tended to decrease the efficiency of several fungicides in controlling apple scab [*Venturia inaequalis*: *R.A.M.*, 32, p. 489], though it was not deleterious to the host.

Krister (C. J.). **Residues of dithiocarbamate fungicides on food crops.**—*Agric. Chemic.*, 7, 9, pp. 45–48, 1 diag., 1952.

The results of studies by the du Pont Company and other agencies in the United States on residues left by ferbam, ziram, zineb, and manzate on eight fresh fruits, eight fresh vegetables, and three canned foods [*R.A.M.*, 32, pp. 435, 635, and preceding abstract] demonstrated that initial deposits were relatively small; the residues weathered rapidly and at harvest time were very low, being relatively independent of the number of treatments or rate of application [cf. 33, p. 165]. They were reduced by washing or processing. Out of 260 samples 96 per cent. retained less than 10 p.p.m. (by weight of the treated fruit or vegetable). All the residues over 5 p.p.m. were obtained from samples taken within seven days of the final spray application. Residues were consistently lower on smooth, bulky fruits and vegetables than on small, fuzzy, or leafy ones. Thus, on tomatoes the maximum manzate residue was 1·3 p.p.m., while Pascal celery showed 8 p.p.m. and Golden 6·3 p.p.m. after stripping and trimming one week following the last of 12 to 15 manzate sprays, and 1·75 and 2·8 p.p.m., respectively, after washing. No residue over 0·4 p.p.m. was found on processed, canned products.

Wellman (R. H.). **Economics of developing agricultural chemicals.**—*Agric. Chemic.*, 7, 9, pp. 32–34, 137, 139, 1952.

The total cost of developing, testing, and producing an efficient agricultural chemical (insecticide, fungicide, or herbicide) in the United States [cf. *R.A.M.*, 31, p. 339] is estimated at $1,382,000, based on the assumption that ineffective compounds are discarded at various stages and that only about one in 1,800

succeeds. Using $1,000,000 as a convenient approximate figure the cost of producing the 50 new chemicals introduced during the past ten years ($5,000,000 per year) was 4 per cent. of the present total dollar volume sold. As at least 40 companies are engaged on work in this field the average annual expenditure of each would be $125,000, which is completely justified by the higher yields accruing to the farmers.

Janke (A.) & Kraus (Hedwig). **Über die Kombinationswirkung von Schwermetallverbindungen und oberflächenaktiven Stoffen auf Pilze.** [On the combined activity of heavy metal compounds and surface-active substances on fungi.] —*PflSchBer.*, 11, 7–8, pp. 97–112, 3 graphs, 1953. [English summary.]

At the Plant Protection Institute, Vienna, experiments were performed to determine the effect on nutrient agar cultures of *Alternaria tenuis*, *Botrytis cinerea*, and *Trichothecium roseum* of combinations of (*a*) phenyl mercuric acetate and (*b*) copper sulphate [cf. *R.A.M.*, 12, p. 523] with varying concentrations of a surface-active quaternary ammonium bromide invert soap known as bradosol (Ciba, Basel, Switzerland). The toxicity coefficient (TK) used to evaluate the activity of the combinations indicates the change in toxicity produced by the admixture, and the ED value of the principal constituent (the fungicide) must therefore be divided by this figure in order to obtain the ED value with the same effect (ED 50 or ED 95) of the fungicide and adjuvant combined. The latter is expressed by the equivalent active quantity of the former. TK exceeding 1 implies the existence of a formal (potentiated) synergistic effect, but as a rule only values above 1·2 denote a significant degree of synergism. Values below 1 do not necessarily signify antagonism between the two components of the mixture, but may result from a stimulatory effect of the admixture on the fungus.

In individual experiments the combinations were mostly synergistic, especially with the lower concentrations of bradosol; in some cases the TK values were above 1·6 and in one test with a mixture of copper sulphate and bradosol (50 mg. per l.) on *B. cinerea* the TK 95 value exceeded 2, i.e., the combination was more than twice as toxic as the fungicide alone.

Singer (R.). **Four years of mycological work in southern South America.**—*Mycologia*, 45, 6, pp. 865–891, 1953.

A summary is given of the more outstanding results, apart from purely taxonomic work, obtained by the author in his study of the Agaricales [*R.A.M.*, 31, p. 147; 33, p. 321] in all parts of South America. Round the large cities and in areas with introduced animals and plants the fungus flora is largely cosmopolitan. In the native woods and forests, however, the percentage of fungi common to S. America is very small; *Schizophyllum commune* is one of the rare examples.

The lower zones of the Bolivia-Tucumán Selva forests are with one exception devoid of non-endotrophic mycorrhiza, but the *Alnus* woods are rich in typical mycorrhiza-forming genera [loc. cit.]. The Sapindaceae were shown to bear mycorrhiza. A study was made of the fungi growing on *Araucaria* in Brazil and those associated with *Nothofagus* in Patagonia, the latter being closely parallel to those associated with the same host in New Zealand and Australia. In the extensive experimental plantations of conifers on Victoria Island, Lake Nahuel Huapi, Neuquén, Argentina, *Suillus* [*Boletus*] *luteus* [31, p. 384] was conquering the whole pine area of the island regardless of the origin of the particular species. This, with the definitely dominant mycorrhiza of *S.* [*B.*] *granulatus* [25, p. 518] in the Rio de La Plata area, sets a new problem. It seems clear that the importance of the mycorrhizal partner, at least in the nursery stage of the afforestation project, can hardly be exaggerated. The same pines under different climatic and soil conditions form mycorrhiza with different fungal partners. To establish the seedlings it is,

therefore, desirable to control the mycorrhizal association and not to leave it to chance, as is being done now. In this area also *Bondarzewia perniciosa* n.sp., was highly damaging to *N. dombeyi*, the most valuable lumber resource of Patagonia. The fungus has spores like *B.* [*Polyporus*] *montana*, but is characterized by its bright golden, tomentose pilei growing together in a complex mass; pale yellow, short, irregular and decurrent tubes; and yellowish-white to white, tough, and peppery flesh. The correct classification of this fungus suggests where to look for similar tree diseases, such as *P. montana* on *Abies nordmaniana* in the Caucasus, and *B.* [*P.*] *berkeleyi* [30, p. 397] on oak in North America. The presence of *Phaeogyroporus* [*Boletus*: cf. 21, p. 414] in Tucumán, Argentina, an area of intensive citrus cultivation, recalls that this fungus is associated with a serious disease [of citrus] in the Rio de Janeiro area, the cryptas setting up conditions which enable pathogens to attack the roots. A similar menace is the presence in Patagonia, the Buenos Aires region, Brazil, and Chile of either *Armillariella* [*Armillaria*] *mellea* or the closely related pathogenic species, *A. puiggarii*.

Kernkamp (M. F.), DeZeeuw (D. J.), Chen (S.-M.), Ortega (B. C.), Tsiang (C. T.), & Khan (A. M.). **Investigations on physiologic specialization and parasitism of Rhizoctonia solani.**—*Tech. Bull. Minn. agric. Exp. Sta.* 200, 36 pp., 5 figs., 1952.

In this bulletin the authors' aim is to recapitulate from the literature (82 references) the existing knowledge of the physiological specialization and parasitism of *Rhizoctonia* [*Corticium*] *solani* [cf. *R.A.M.*, 22, p. 86; 24, pp. 88, 261; 26, p. 146; 30, p. 258, and next abstract] and record the results of several investigations on the subject made in the Division of Plant Pathology, University of Minnesota, during the past 15 years.

C. solani comprises an indefinite number of races differing culturally and pathogenically. The host range is exceptionally wide. In culture the races differ in numerous characters, all of which appear to be influenced by environment. S.-M. Chen (Studies on *Rhizoctonia solani* Kühn: PhD. Thesis, University of Minnesota, 1943) demonstrated that variation can be induced in cultures of isolates from natural habitats by manipulation of the environment. He was able to stimulate by chemical means considerable sectoring in certain races, the induced variants differing in the same magnitude in every respect as did natural isolates. He found as much aversion between a variant and its parent as between cultures isolated from nature. The diameter of the hyphae of different natural races and of the variants ranged from 5·17 to 10·23 μ. In two instances races gave rise to mutants with hyphae half the diameter of those of their respective parents. There were also wide variations in size, structure, and aggregation of sclerotia.

Certain races appear to be more specific for certain crops than for others, and if this is confirmed rotation may prove to be one means of controlling the fungus.

Tsiang investigated factors influencing sclerotial survival (C.-T. Tsiang, Studies on root rot of flax caused by *Rhizoctonia solani* Kühn: ibid., 1947). The sclerotia from different races responded quite differently to chemicals, and cultures arising from some chemically treated sclerotia gave rise to numerous variants. Thus, improper chemical treatment may not only fail to control *C. solani*, but may induce the formation of new strains more pathogenic than the original.

Host resistance, host nutrition, fungus toxins, and possibly fungus nutrition are interrelated. A. M. Kahn (Factors affecting the pathogenicity of *Rhizoctonia solani* on legumes: ibid., 1950) demonstrated that soy-beans grown in calcium- and magnesium-deficient soils were predisposed to infection by *C. solani*. The cortical tissue of these plants was deficient in these elements and the cells of that tissue were improperly laid down, with thin walls and large intercellular spaces. *C. solani*

was ascertained to digest cellulose and pectin, infected tissue being characterized by dissolution of the middle lamella. These results suggest that it may be possible to control the fungus by soil amendments with calcium or magnesium.

EXNER (BEATRICE). **Comparative studies of four Rhizoctonias occurring in Louisiana.**—*Mycologia*, 45, 5, pp. 698–719, 9 figs., 1953.

Tissue cultures at Louisiana State University, Baton Rouge, of host material infected with *Corticium solani* [see below, p. 383, and preceding abstract], *C. microsclerotia*, *C. sasakii* [*R.A.M.*, 32, p. 192], and an undetermined *C.* species from fig [cf. 19, p. 294] gave fairly distinct cultural forms associated with the diseases caused by each fungus, but single basidiospores gave a large number of cultural types differing in appearance, growth rate, and pathogenicity [cf. 33, p. 109] to bush snap bean (*Phaseolus vulgaris*) seedlings. Strains from basidiospores of one fungus were indistinguishable from strains of the other three. Moreover, the fungi could not be distinguished by their mycelial characters or average measurements of the basidiospores or basidia. As many as 29 distinct strains could be obtained by isolations from a single mat of *C. solani*. It is suggested that they arise by segregation.

The taxonomy of these fungi is discussed and, as they cause distinct diseases, four forms of *Pellicularia filamentosa* are suggested for them: f.sp. *solani*, causing basal stem and root rots of various hosts; f.sp. *microsclerotia*, causing web-blight of snap bean, lima bean (*Phaseolus lunatus*), and fig; f.sp. *sasakii*, causing leaf and sheath spot of grasses and a leaf blight of various dicotyledons; and f.sp. *timsii* n.f. causing leaf blight of fig.

Distribution, symptoms and control of some of the more important plant diseases.—*Plant Dis. Reptr*, *Suppl.* 221, pp. 107–181, 1953. [Multilithed.]

This selected list of the important economic plant diseases occurring in the United States [cf. *R.A.M.*, 5, p. 568; 32, p. 680; 33, p. 167] (and those of banana and *Hevea* rubber), compiled by the Yearbook of Agriculture Committee for the benefit of both pathologists and non-pathologists, includes hosts (common names in alphabetical order), common name and causal agent, distribution, symptoms, and control.

BRANCATO (F. P.) & GOLDING (N. S.). **The diameter of the mold colony as a reliable measure of growth.**—*Mycologia*, 45, 6, pp. 848–864, 1 fig., 5 graphs, 1953.

In a study at the Department of Dairy Science, State College of Washington, Pullman, of the influence of temperature, concentration and initial pH of the medium, relative humidity, size and age of the spore inoculum, thickness of the substratum, and atmosphere in the Petri dish on the diameter (two measurements at right angles) attained by colonies of *Aspergillus niger*, *A. flavus*, *Penicillium notatum*, *P. expansum*, *P. roqueforti*, and *Geotrichum candidum*, the results obtained agreed, in general, with those of other workers [cf. *R.A.M.*, 2, p. 328] and of different strains of the fungi used in the present work. Temperature and concentration of the medium were important variables requiring careful control.

It is concluded that the use of the diameter of a colony as a measure of growth can be relied upon for determining growth rates and comparing the effects of environmental factors on a fungus cultured on the same medium. If an accurate assessment of the amount of growth is required, inspection of the giant colony will show whether this method of measuring growth has introduced a gross error.

BUTLER (J. A. V.) & RANDALL (J. T.). **Progress in biophysics and biophysical chemistry. Vol. 3.**—viii+386 pp., 3 pl., 24 figs., 14 diags., London, Pergamon Press Ltd., 1953.

Some physico-chemical studies on viruses are reviewed by R. MARKHAM (pp. 61–87), covering centrifuge techniques, quantitative centrifugation measurements,

microscopical methods, the study of virus crystals with special reference to tobacco mosaic [*R.A.M.*, 33, p. 264], [tomato] bushy stunt, tobacco necrosis, southern bean mosaic, and turnip yellow mosaic viruses, and the properties of tobacco mosaic virus solutions. A bibliography of 72 titles is appended.

M. Errera (pp. 88–130) discusses the mechanisms of biological action of ultraviolet and visible radiations (263 references) and includes examples of some effects of these rays on fungi, bacteria, and bacteriophages.

Microspectrometry of living and fixed cells is dealt with by H. G. Davies and P. M. B. Walker (pp. 195–236) with 193 references.

Gordon (W. L.). **Geographical distribution of mating types in Gibberella cyanogena (Desm.) Sacc.**—*Nature, Lond.*, 173, 4402, pp. 505–506, 1954.

Studies at the Plant Pathology Laboratory, Winnipeg, of mass isolates from different parts of the world demonstrated that the mating types m.t.^{A} and m.t.^{a} of *Gibberella cyanogena* [cf. *R.A.M.*, 33, p. 245] and of its conidial state *Fusarium sambucinum* f. 6 occur separately in nature; in no instance did they occur together in the same mass isolate.

Johnstone (K. I.). **Micromanipulation on an agar surface for the isolation and cultivation of single organisms.** *J. gen. Microbiol.*, 9, 2, pp. 293–304, 6 diags., 1953.

Experiments in the Department of Bacteriology, Leeds University, demonstrated that single organisms may be isolated by micromanipulation under sterile conditions on the upper surface of an agar block, using a manipulating microscope carrying a nosepiece attachment and holder in which a glass microneedle and an electrically heated platinum marking needle may be fixed. A separate microscope is used for the observations. To obviate the necessity for changing the needles the marking needle may be mounted in a micromanipulator on the other side of the observing microscope. Clear agar is essential and either dark-ground or phase-contrast illumination may be employed, the latter with both long and short working distance. The agar block, 2·5 by 1 by 0·2 cm., is enclosed in a perspex cell with a side opening for the manipulator and an aperture for the objective. The block is inoculated at one side, the single organism is drawn to the other side, and the position is marked. The process is repeated and finally the whole block is incubated. Single growing colonies are then cut out. Methods for making the necessary microneedle tips and simple needle tips are described.

Thirumalachar (M. J.) & Narasimhan (M. J.). **Notes on some mycological methods.**—*Mycologia*, 45, 3, pp. 461–468, 1 fig., 1953.

A water mounting medium suitable for fungi which renders the mount permanent and hard, yet retains the clarity of the objects, is prepared as follows: 20 gm. powdered gum arabic are dissolved in 30 ml. distilled water to make a uniform gel; 10 gm. chloral hydrate [*R.A.M.*, 32, p. 495] and 10 gm. dextrose are added, and the mixture is slightly warmed until a uniform, viscid solution has formed; 3 ml. glycerin are added, and the solution is well stirred. The objects may be stained, if required, with cotton blue or acid fuchsin in lactophenol, any excess of lactophenol being drained off before adding the mountant. The slides are kept at 40° to 45° C. for 48 hours until the medium has hardened; the cover glass is sealed with a solution of canada balsam in chloroform, and the slides are again kept warm for a few hours.

The most useful adhesive for fixing spores to slides before germination was found to be the mucilage from freshly cut stems and flowering stalks of *Tradescantia* (?) *virginiana*, mixed with the spore material in a drop of water on the slide. A uniform smear is made and air-dried. With alternate moistening and drying of the slides,

the material becomes firmly fixed. Steeping the slides for 10 to 20 minutes in 0·01 per cent. potassium permanganate reduced contamination and stimulated germination in most cases. The slide is then inverted over a water surface by a method already described [27, p. 136] until enough spores have germinated, when the material is fixed, stained, and mounted.

Plant material collected and placed inside a banana leaf sheath, folded on either side and tied with string, remained fresh for over 12 days in Indian conditions during transit by rail and post. In a similar chamber leaves inoculated with rust spores [unspecified] remained in a fresh condition five or six days longer than in Petri dishes.

Stessel (G. J.), Leben (C.), & Keitt (G. W.). **Screening tests designed to discover antibiotics suitable for plant disease control.**—*Mycologia*, 45, 3, pp. 325–334, 2 figs., 1953.

This description of screening procedures, employed at the University of Wisconsin in a search for soil micro-organisms producing antibiotics for use in plant disease control, is an expanded account of work already noticed from another source [*R.A.M.*, 30, p. 622]. The plant pathogens used were *Agrobacterium* [*Bacterium*] *tumefaciens*, *Colletotrichum circinans*, *C. pisi*, *Erwinia amylovora*, *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*, *F.o.* f. *pisi*, *Glomerella cingulata*, *Helminthosporium victoriae*, *Sclerotinia fructicola*, and *Verticillium albo-atrum*. Five isolates of *Streptomyces* [33, pp. 168, 246] and one of *Bacillus subtilis* [33, p. 105] produced the most inhibitory substances and were selected for further study.

Tuffery (L.). **Antibiotics and disease. Experiments with plants.**—*N.Z. Gdnr*, 10, 5, pp. 340–341, 1954.

In a series of amateur experiments the author has shown that spraying lilies (especially the susceptible *testaceum* and *szovitzianum* types) with a freshly-prepared solution of streptomycin [cf. *R.A.M.*, 32, p. 704] at a concentration of 30 p.p.m. once or twice (with a day's interval) gave good control of *Botrytis* sp. [cf. 31, p. 119] in his garden in New Plymouth, New Zealand. The sprayed lilies lost the lower infected leaves, but the new ones formed in eight weeks after spraying showed little *Botrytis* infection though climatic conditions were favourable for it and the unsprayed were attacked.

Potatoes sprayed twice when 6 in. high, and broad beans once, showed no signs of *Phytophthora infestans* and *Uromyces fabae*, respectively, though these diseases were present on neighbouring plants.

The antibiotic has had no apparent effect on the plants tested so far.

Jefferys (E. G.), Brian (P. W.), Hemming (H. G.), & Lowe (D.). **Antibiotic production by the microfungi of acid heath soils.**—*J. gen. Microbiol.*, 9, 2, pp. 314–341, 1953.

A plating method was used at the Butterwick Research Laboratories, Welwyn, Herts., for studying the fungi in acid, sandy, podsol soils from Bagshot, Surrey, and Wareham Heath, Dorset, and their distribution at different levels of the soil profile [*R.A.M.*, 31, p. 142]. The most common species included *Absidia orchidis*, *Mortierella alpina*, *Mucor ramannianus*, *Penicillium frequentans*, *P. nigricans*, *P. roqueforti*, *P. terlikowskii*, and *Trichoderma viride*. Those locally abundant included *A. glauca*, *Coniothyrium* sp., *Gliocladium* sp. (of the *roseum* series), *P. citrinum*, and *Zygorrhynchus moelleri*. Counts of viable fungi decreased sharply from upper to lower levels. Most species were characteristically most frequent in the upper layers of the A horizon but *M. ramannianus* was abundant at much lower levels. In several profiles it was isolated from the B horizon in almost pure culture.

Of the 65 species isolated about half produced antibiotics [32, p. 441], most of

them toxic to both fungi and bacteria. None of the phycomycetes, which were less abundant and widespread, produced antifungal substances. There is some evidence that widespread non-producers are relatively resistant to the antibiotics produced by other species.

Only 26 per cent. of the fungi isolated, chiefly the phycomycetes, were unable to utilize carboxymethylcellulose; 35 per cent. of the rare fungi, 54 per cent. of the locally abundant ones, and 17 per cent. of the widespread ones (all phycomycetes) were 'sugar fungi' [32, p. 643].

These results suggest that antibiotic production is of ecological significance to soil fungi.

Yarmolenko (L. I.) & Nahimovskaya (Mme M. I.). Бактерия из группы **Bacillus mesentericus** — антагонист актиномицетов. [Bacteria of the *Bacillus mesentericus* group—antagonistic to actinomycetes.]—Микробиология [*Microbiology, Moscow*], 21, 3, pp. 300–302, 1 pl., 1952.

In studies at the 1st Lenin Medical Institute, Moscow, U.S.S.R., a bacterium of the *Bacillus mesentericus* group, producing substances antagonistic to various actinomycetes, was isolated [from soil]. It depressed the formation of aerial mycelium and enhanced pigmentation.

Schenck (N. C.) & Carter (J. C.). **A fungistatic substance extracted from vitrain.**—*Science*, 119, 3085, pp. 213–214, 1 diag., 1954.

After referring to W. D. Evans's report (*Colliery Engng*, 28, pp. 465, 513, 1951) of a bacteriostatic substance, 'vitricin', in the vitrain of English coals, which inhibited *Bacillus subtilis*, the authors report that vitrains from coals in northern and southern Illinois and Wyoming all contain soluble fungistatic material. Two chromatographs developed from Hanna Basin vitrain coal were tested on potato dextrose agar against spore suspensions of fungi. *Aspergillus niger*, *A. terreus*, *Myrothecium verrucaria*, *Glomerella cingulata*, *Colletotrichum trifolii*, *Verticillium albo-atrum*, *Endoconidiophora fagacearum* [*Chalara quercina*], and *Ceratostomella ulmi* were all inhibited, *A. niger* the least and *Chalara quercina* the most. The extract was fungicidal to *C. quercina* and *Colletotrichum trifolii*, and fungistatic on the remaining fungi.

Shema (B. F.) & Conkey (J.). **Relative toxicity of disinfectants available for use in the pulp and paper industry.**—*T.A.P.P.I.*, 36, 11, pp. 20A, 22A, 26A, 28A, 30A, 1953.

In further studies at the Institute of Paper Chemistry, Appleton, Wisconsin, on the control of micro-organisms in pulp and paper mill systems [*R.A.M.*, 26, p. 254], 93 disinfectants were tested against two bacteria, *Aspergillus niger*, and *Penicillium expansum*. Their relative toxicities, chemical composition, and manufacturers are given. In general, the most toxic were the organo-mercurials [cf. 32, p. 142] and combinations containing them, chlorinated phenols were intermediate, and the quaternary ammonium compounds relatively ineffectual and unlikely to prove of practical use for the object in view. The fungi tended to be more resistant to elimination by chemicals than the bacteria.

Hacskaylo (E.). **Pure culture synthesis of Pine mycorrhiza in terra-lite.**—*Mycologia*, 45, 6, pp. 971–975, 2 figs., 1953.

At the George Washington University, Washington, D.C., *Pinus virginiana* seeds were sterilized, germinated, and sown when the radicles were approximately 15 mm. long in 2-l. Erlenmeyer flasks filled to a depth of 5 cm. with a sterile medium (pH 5·2 to 5·4) consisting of terra-lite (Vermiculite Products Inc., Houston, Texas) plus 720 ml. of Melin's nutrient solution as modified by Norkrans [cf.

R.A.M., 16, p. 49; 29, p. 44, and next abstract]. The medium was inoculated at the same time with mycelium of *Lepiota rhacodes*. After four months' growth in the greenhouse extensive root development with well-developed ectotrophic mycorrhiza of the unbranched and singly forked types had taken place, and heavy mycelial growth in the medium. The shoots had begun to develop lateral branches, averaging 15 cm. in height, and had green, healthy-looking leaves.

In Sweden the author grew *P. sylvestris* [loc. cit.] in 500-ml. culture flasks, using 15 gm. terra-lite and 120 ml. nutrient solution. After two months' growth the seedlings were inoculated with suspensions of *Boletus variegatus* and *Rhizopogon roseolus* and 20 ml. more nutrient added. One month later the seedlings had developed shoots 8 to 12 cm. high, were actively growing, and had healthy-looking foliage. Root growth was extensive and the fungi had spread thickly throughout the medium. Ectotrophic mycorrhiza of the unbranched, singly forked, and coralloid types had grown profusely in cultures with both fungi.

Melin (E.). **Growth factor requirements of mycorrhizal fungi of forest trees.**—*Svensk bot. Tidskr.*, 48, 1, pp. 86–94, 7 figs., 1954.

Studies at the Institute of Physiological Botany, University of Uppsala, Sweden, on the growth factor requirements of mycorrhizal pine roots [*R.A.M.*, 28, p. 300, and preceding abstract] revealed that all the mycorrhiza-forming hymenomycetes and gasteromycetes tested were partially or totally deficient for thiamine. Most species were heterotrophic for both thiazole and pyrimidine, while *Tricholoma albobrunneum*, *T. fumosum* [30, p. 484], *T. imbricatum*, *T. pessundatum*, and *T. vaccinum* were more deficient for pyrimidine than for thiazole. Some *Cortinarius* species showed a reduced capacity for synthesizing thiamine from its two components. Most of the basidiomycetes investigated benefited greatly from small amounts of amino acids in nutrient media containing ammonium nitrogen [32, p. 268]. The different requirements seem to indicate that in nature the main sources of these substances may be the soil and not the roots. *Boletus bovinus* and *B. luteus* grew extremely well on excised *Pinus sylvestris* roots in a nutrient solution supplemented by amino acids plus B-vitamins, but the most conspicuous growth-promoting effect was in species which developed very poorly in the absence of roots, e.g., *Russula xerampelina*, *Pholiota caperata*, and *C. glaucopus*. In the flasks without roots growth was barely visible to the naked eye; with roots and thiamine it was usually considerably less than with roots and full vitamins. It is concluded that the pine roots produce one or more growth-promoting metabolites essential to the growth of tree mycorrhizal fungi, which are deficient in these substances. Excised tomato roots affected the growth of these fungi in the same way as pine roots, indicating that the metabolite is not specific to pine roots. It also occurred in germinating pine seeds.

When excised pine roots produced aseptically were transferred to nutrient agar containing a homogenized mycelial suspension of *B. variegatus* [see preceding abstract] and supplemented by a mixture of B-vitamins and amino acids several large colonies developed around the roots; in other parts of the plate the colonies were small. Roots placed in celluloid sacks on the agar also caused the colonies round the sacks to develop rapidly. It was evident that a growth-promoting metabolite stimulating the rhizosphere effect had been exuded from the roots.

Winter (A. G.) & Birgel (G.). **Untersuchungen über die Verbreitung, Ökologie und funktionelle Bedeutung der endotrophen Mykorrhiza bei gärtnerischen Kulturpflanzen.** [Studies on the distribution, ecology, and functional significance of the endotrophic mycorrhiza in cultivated garden plants.]—*Naturwissenschaften*, 40, 14, pp. 393–394, 1953.

Of 173 horticultural plants examined at Prof. Winter's laboratory at Bonn and

the firm of Dr. Madaus & Co., Cologne-Merheim, Germany, 96 yielded endotrophic mycorrhiza [*R.A.M.*, 32, p. 269 and next abstract], some of which were more closely investigated. Those of *Clematis vitalba* and *Colchicum autumnale* belong to the *Paris quadrifolia* type, being furnished with numerous attachments to the soil and a vigorous outer mycelium, whereas in *Cosmos bipinnatus* and *Chlorophytum comosum* they were of the *Arum maculatum* type, the connexions being very sparse and the mycelium poorly developed. *Clematis vitalba* seedlings and *Colchicum autumnale* bulbs freed from mycorrhiza by sterilization produced them again in sand, compost, and needle and leaf mould but not in unamended peat. Mycorrhiza-free layers of *Cosmos bipinnatus* and *Chlorophytum comosum* formed mycorrhiza only in sand, compost, and needle mould. The more profuse the mycorrhizal development, the poorer was the growth of *C. comosum* layers, for which peat was by far the best medium. A comparison between plants with and without mycorrhiza in natural and sterilized sand showed that the symbionts actually impeded the growth of the host, especially in highly nutritious soils, thereby representing a case of dyssymbiosis. On the other hand, mycorrhiza-free *Clematis vitalba* seedlings fail after a few weeks on peat, and on sterilized river sand develop much less well than those with mycorrhiza in non-sterile sand (eusymbiosis). Neither in *Colchicum autumnale* nor in *Cosmos bipinnatus* did the presence or absence of mycorrhiza appear to exert any definite influence on host growth.

In no case could the mycorrhiza of these four plants be grown in pure culture. The *Clematis vitalba* symbiont was transmitted by means of the roots or their soil to oat, wheat, rye, barley, maize, and pea plants, though arbuscules failed to develop on the artificially infected hosts. No mycorrhiza were formed on *Crocus*, *Scilla*, *Colchicum autumnale*, or *Muscari* on a wide range of soils in the greenhouse, but copious growth developed on *C. autumnale* on the same substrata in the open, indicating a connexion between climatic factors and mycorrhiza.

Winter (A. G.). **Zum Problem der Mykorrhiza bei landwirtschaftlichen Kulturpflanzen. I. Die Mykorrhizen der Gramineen.** [On the problem of mycorrhiza in agricultural cultivated plants. I. The mycorrhiza of the Gramineae.]—*Z. PflErnähr. Düng.*, 60 (105), 3, pp. 221–243, 23 figs., 1953.

Many of the contributions forming the basis of this survey of mycorrhiza in the Gramineae [cf. preceding abstract] have already been noticed. In Germany mycorrhiza are scarcely less prevalent among agricultural crops than in the forest, but their significance in the two environments is of quite a different order. In the former all the facts point to a generally harmless dyssymbiosis, which may become injurious, however, in cases of heavy infestation. Schlicht's argument (*Landw. Jb.*, p. 478, 1889) that agricultural crops cannot compete with natural plant associations because of the absence of mycorrhiza is equally untenable with the views of Howard (German translation of 'My agricultural testament', Siebeneichenverlag, Berlin-Frankfurt, 1948) as to the importance of mycorrhiza in crop nutrition through the decomposition of humus, and the assumption of these authors and Stahl (*Jb. wiss. Bot.*, 34, p. 534, 1900) that mycorrhiza are absent from soils with few nutrient salts and much humus.

Somm (H.). **Beiträge zur Kenntnis der Wachstums- und Atmungsphysiologie von Mycelium radicis atrovirens Melin mit besonderer Berücksichtigung der Stickstoffquelle und einiger Mono-, Di- und Tricarbonsäuren.** [Contributions to the knowledge of the physiology of the growth and respiration of *Mycelium radicis atrovirens* Melin, with special reference to the source of nitrogen and some mono-, di- and tricarboxylic acids.]—Thesis, Federal Technical Institute, Zürich, 101 pp., 1 fig., 1 diag., 16 graphs, 1953. [Mimeoprinted.]

This is an expanded, fully tabulated account of studies on *Mycelium radicis*

atrovirens, preliminary notices of which, in collaboration with T. Wikén, have already appeared [*R.A.M.*, 32, p. 205]. [An abridged version of the work is presented in *Schweiz. Z. Path.*, 15, pp. 478–483, 1 graph, 1952; 16, pp. 851–859, 2 graphs, 1953.]

Goodman (R. N.) & Hemphill (D. D.). **The effects of indole-3-acetic acid on the plant disease-inhibiting properties of antibiotics.**—*Science*, 119, 3089, pp. 347–348, 1 graph, 1954.

In greenhouse experiments at the Department of Horticulture, University of Missouri, Columbia, a single spray combining streptomycin [cf. *R.A.M.*, 33, p. 157] and terramycin [loc. cit.], each at 250 p.p.m., was applied to the foliage of one-year-old potted Jonathan apple trees, which were inoculated subepidermally with *Erwinia amylovora* [loc. cit.] 24 hours later. The disease control obtained varied from 90 to 100 per cent., indicating that the antibiotics were systemic in action. When the experiment was repeated on trees that had been stored at 32° F. from November, 1952, until the end of September, 1953, disease control ranged from 10 to 50 per cent. From the appearance of the trees it seemed that the substance or substances responsible for the apical dominance phenomenon had been destroyed or altered during the prolonged storage. The leaf chlorosis characteristic of streptomycin treatment was absent.

As the evidence suggested that indole-3-acetic acid might increase the effectiveness of antibiotics against *E. amylovora*, an aqueous suspension of the bacterium was injected subepidermally at a point midway between the apex and the first node of a vigorously growing shoot 24 hours after one of the following treatments had been applied: (1) methyl cellosolve, carbowax 4000, and 100 p.p.m. indole-3-acetic acid; (2) antibiotics plus methyl cellosolve and carbowax 4000; (3) the same plus 100 p.p.m. indole-3-acetic acid. Trees kept in cold store from November, 1952, to September, 1953, responded less favourably to antibiotic treatment than those kept only until January. The addition of the indole-3-acetic acid to the antibiotic formulation increased the protection from 25 to 87 per cent. The evidence suggests that indole-3-acetic acid plays some part in the disease-inhibiting action of antibiotics and, possibly, in that of the plant.

Banbury (G. H.). **Processes controlling zygophore formation and zygotropism in Mucor mucedo Brefeld.**—*Nature, Lond.*, 173, 4402, pp. 499–500, 1954.

The author presents preliminary results of his studies in the Botany Department, University College, Ibadan, Nigeria, which show that zygophores of *Mucor mucedo* [cf. *R.A.M.*, 32, p. 330] are produced when opposite strains are separated by a permeable celloidin film but not when separated by an air gap of 3 mm. Some evidence was secured to indicate that culture extracts would induce zygophore formation in single strains. Zygotropism appeared to be a form of chemotropism and not a response to electromagnetic radiation (*Planta*, 23, p. 358, 1935).

Schick [R.]. **Eine Methode zur Erzeugung gesunden Kartoffelpflanzgutes in den Abbaulagen.** [A method for the production of healthy Potato 'seed' in 'degeneration' areas.]—*Dtsch. Landw.*, 4, 7, pp. 365–366, 1953.

In view of the urgent need for the production of disease-free potato 'seed' in the so-called 'degeneration' areas of eastern Germany [*R.A.M.*, 33, p. 172], it is suggested that the method devised by Professor [H.] Wartenberg of Jena of lifting healthy plants early before they become infected by virus should be tested in the current year.

A particularly healthy-looking stand with less than 15 per cent. virus diseased plants, covering about 1 ha., of the most important variety is selected, and at the onset of flowering all diseased plants are eliminated. Ten days after the end of

flowering the tops are pulled and the tubers left in the ground for another three to four weeks, when they are harvested and stored in narrow, shallow clamps to avoid heating. In more heavily infested fields the tops of the healthy plants are pulled ten days after flowering and laid down *in situ* so that they may be recognized three weeks later, when their tubers are harvested separately with a hand hoe and carefully stored as described. In both lightly and heavily infested fields a stand planted as early as possible should be selected to produce tubers upwards of 2 cm. in diameter for planting.

Skogley (C. R.). **Results with various chemicals for Potato vine killing.**—*Amer. Potato J.*, 30, 6, pp. 140–142, 1953.

In tests carried out at Rhode Island Agricultural Experiment Station on Green Mountain potatoes with various haulm killers [cf. *R.A.M.*, 27, p. 581; 28, p. 480; 32, p. 395] 100 per cent. kill was given by penite 6 (1½ gals. per acre) in 1949 and 1950, dowspray 66 (3 gals.) plus aluminium sulphate (3 lb.) in 1947, vinetox (3 gals.) in all three years, white arsenic plus caustic soda (9+22 lb.) and sulphuric acid (175 lb.) in 1947, and dow general plus fuel oil plus aluminium sulphate (3 pints : 3 gals. : 3 lb.) in 1950. Slight stem-end discoloration of the tubers occurred whenever a fair to good kill was obtained. Five years' tests and demonstrations have confirmed the value of chemical haulm killers, which proved much less expensive than flaming or rotobeating. The arsenicals penite 6 and vinetox gave the best results and were among the least expensive materials.

Boyd (A. E. W.) & Henderson (J. Margaret). **Susceptibility of immature Potato tubers to blight.**—*Plant Path.*, 2, 4, pp. 113–116, 1953.

In an experiment carried out in Fife in 1948 with Arran Pilot and in 1949 with Doon Star about 200 random samples of tubers were lifted by hand (during attack by blight [*Phytophthora infestans*: *R.A.M.*, 32, p. 585] on the haulms) at intervals from the beginning of August, care being taken to prevent the tubers from touching the blighted haulms. The samples were subjected to equal amounts of riddling next day, stored in sterilized bags for two weeks, and then placed in chitting trays.

Considerable tuber rotting developed even when only a few blighted leaflets were present on the haulms and in general, tuber blight decreased with increasing leaf infection associated with the advance of the season, immature tubers being very susceptible. This was confirmed experimentally in 1952 on tubers of Doon Star, Golden Wonder, and King Edward artificially inoculated with a sporangial suspension.

To eliminate the factor of skin resistance, an experiment was made with portions of cut tubers taken from the same samples and inoculated as before. In Golden Wonder and Doon Star there was a slight tendency for resistance (as measured by mean depth of penetration) to increase with tuber maturity until almost the end of the season, and then to decrease; with King Edward the tubers appeared to increase in resistance up to the end of the growing season.

It is concluded that as growing potatoes mature, their resistance to blight increases, though not due solely to the greater mechanical resistance of the skin, as the increase was found in severely skinned tubers. Under favourable conditions more severe tuber infection may be expected from an early blight attack than a late one. It is to be expected that early lifting of blighted crops would entail much more serious consequences than delayed lifting.

Wallin (J. R.). **The production and survival of sporangia of Phytophthora infestans on Tomato and Potato plants in the field.**—*Phytopathology*, 43, 9, pp. 505–508, 1 graph, 1953.

The studies herein reported from the Iowa Agricultural Experiment Station,

covering the period from 1950 to 1952, were conducted at two localities in the State, namely, Clear Lake and Ames. Leaves of Cobbler potatoes and tomatoes were inoculated with *Phytophthora infestans* [see next abstract] or allowed to become naturally infected, and observation was kept on sporangial development at two- to three-hourly intervals during the day and night. By careful sampling it was found that sporangia were produced and remained viable when temperatures were over 80° F. and relative humidity below 50 per cent. [cf. *R.A.M.*, 33, p. 274], but production was most copious when temperatures were below 70° and relative humidity above 90 per cent.

Sporangia were produced on both shaded and unshaded leaflets, being more numerous on the former, but when exposed to afternoon temperatures above 90° they were not viable by evening. Particularly striking was the appearance of viable sporangia within six hours of brushing previously formed sporangia from the leaflets at periods of the day usually regarded as adverse to their formation [14, p. 391 *et passim*]. The largest numbers of sporangia developed on two days when the daily temperature maxima were 69° and 72°.

French (A. M.). **Physiologic differences between two physiologic races of Phytophthora infestans.**—*Phytopathology*, 43, 9, pp. 513–516, 1953.

At the Department of Plant Pathology, Cornell University, Ithaca, New York, differences were observed between the nutritional responses of the common field race A of *Phytophthora infestans* [see preceding abstract] and race B, which is pathogenic to various hybrids resistant to the former [*R.A.M.*, 32, p. 208; 33, p. 250]. Thus, asparagine and certain amino acids (aspartic and glutamic acids, arginine, glycine, and alanine), which were poor sources of nitrogen for race A in synthetic liquid media, were effectively utilized by B. The growth of race A, but not that of B, was inhibited by ammonium salts and succinic acid, each at a concentration of 1 gm. per l. A component of raw sugar used as a substitute for dextrose acted as a powerful stimulant of race A, increasing its growth 20-fold [see next abstract], but did not affect B. Yeast extract was also found to contain important growth factors for both races, non-dialysable for A and dialysable for B.

On the basis of these studies, a synthetic agar medium was formulated containing, *inter alia*, asparagine, ammonium nitrate, succinic acid, dextrose, and thiamin, which supported the growth of race B but did not permit the development of A.

D'Oliveira (Maria de L.) & De Moura (Maria A.). **Um meio de cultura para Phytophthora infestans e outros microorganismos.** [A culture medium for *Phytophthora infestans* and other micro-organisms.]—*Broteria*, 22, 3, pp. 138–143, 1953. [English summary.]

A culture medium that has been found very useful at the National Agronomic Station, Sacavém, Portugal, for the primary isolation and maintenance of *Phytophthora infestans* [cf. preceding abstract] and other fungi, especially phycomycetes, consists of 2 per cent. sucrose and 1 per cent. agar in distilled water, to which a few aseptically shelled garden peas are added after the tubes have been sterilized for 20 minutes at 120° C. [cf. *R.A.M.*, 27, p. 441 and next abstract]. A decoction of dried *Cicer arietinum* seeds (20 per cent.) plus 2 per cent. sucrose and 1 per cent. agar gave equally satisfactory results when fresh peas were not available, both media supporting luxuriant growth and stimulating sporulation.

Keay (Margaret A.). **Media for the culture of Phytophthora infestans.** *Plant Path.*, 2, 3, p. 103, 1953.

A medium suitable for maintaining the pathogenicity of *Phytophthora infestans* in culture, modified from that suggested by d'Oliveira and de Moura [see preceding

abstract], is prepared from 250 gm. dried seeds of *Cicer arietinum* or pea, 20 gm. sucrose, 15 gm. agar, and distilled water. The seeds are washed in tap water for an hour, soaked in distilled water overnight, mashed with the water in which they have soaked (made up to a litre with distilled water), steamed for an hour, and then strained. The sucrose and agar, dissolved in a little water, are then added to prevent frothing, and the whole, made up to 1,000 ml., is tubed and sterilized for 15 minutes at 10 lb. pressure.

Large (E. C.) & Taylor (G. C.). **The distribution of spray deposits in low-volume Potato spraying.**—*Plant Path.*, 2, 3, pp. 93–98, 2 pl. (between pp. 88 and 89), 1 fig., 1953.

In an investigation carried out at Tangmere, Sussex, in 1952, the degree of coverage obtainable on the upper and lower surfaces of potato leaves by low-volume spraying with different nozzle equipments and different arrangements of the spray boom and lances was determined from the distribution of the spray deposits [*R.A.M.*, 33, p. 165] by a leaf-printing method (with rubeanic acid as the developer) when a copper material, as used against potato blight [*Phytophthora infestans*], was included in the test fluid, and also the initial deposits and the residues after weathering, when DDT was used (analysed by Schechter-Haller's colorimetric method). Several different tractor-mounted spraying machines were employed. The tests were made on Arran Banner and Home Guard plants still in bud and not yet meeting across the drills. Five different nozzle arrangements were used: (1) drop legs, air blast nozzles, four per row, two above the foliage, two at the base, spraying at 4·4 m.p.h. and 10 to 11 gals. per acre; (2) drop lances, three Bray 000 fan nozzles per row, one centrally above the plants, one on either side at base, giving a fogging effect at 100 lb. per sq. in., 3·4 m.p.h., and 19 to 21 gals. per acre; (3) drop lances, four swirl nozzles (2/64 in. disks) per row, one on either side above the plants, one on either side at base, giving cones of spray at 40 to 50 lb. per sq. in., 3·1 m.p.h., and 15 to 18 gals. per acre; (4) without drop lances, two Tee-jet 15/40 fan nozzles per row, at 14 in. spacing along a straight boom above the plants only, sweeping the plants with fan-shaped sprays at 50 lb. per sq. in., 4·6 m.p.h., and 26 to 29 gals. per acre; and (5) the same with about $1\frac{1}{2}$ Fan-jet size 0 nozzles per row, 18 in. spacing, 3·2 m.p.h., and 26 to 27 gals. per acre.

The degree of coverage obtained with copper deposits varied greatly from leaf to leaf with all methods of spraying. There was no significant difference in the coverage of the upper leaf surfaces but that of the under surfaces varied widely with the method of spraying. When the plants were sprayed from above only, cover of the under surfaces of the leaves both at the top and the base of the plants was negligible. Only where drop lances or drop legs were used was there substantial cover of the lower surface.

With DDT the total deposition on the lower leaves was about half that on the upper by all methods except the third, where it was approximately equal. Methods (2) and (5) gave significantly higher deposits on the upper leaves than the other methods. On the lower leaves about two-thirds of the DDT was lost after 18 days. The apparent loss on the upper leaves was greater.

It is concluded that where cover of the lower surfaces of potato leaves is desirable the need for drop lances is indicated. Further trials are required with potatoes in more advanced stages of growth.

Potato skin spot in 1953.—*Plant Path.*, 2, 4, pp. 139–140, 1953.

During the past three seasons potato skin spot (*Oospora pustulans*) has been unusually prevalent in England [*R.A.M.*, 28, p. 479]. In 1953 it was commonly present on consignments of seed, mostly from Scotland, either on arrival in England or later, during storage. It was also frequently found on planted tubers that had

failed to sprout, less in the south than in the north. Dry, cold conditions just after planting were in part responsible for prevalence. King Edward, Majestic, Arran Chief, Ulster Prince, Dr. McIntosh, Red King, and Arran Banner were reported to be affected.

Spalla (C.) & Boncompagni (T.). **La malattia detta 'scabbia' dei tuberi di Patata.** [The disease called 'scab' of Potato tubers.]—*Notiz. Malatt. Piante, 1953*, 23 (N.S., 2), pp. 29–41, 1953.

In this introductory paper the authors review the available information (27 references) on the different forms of potato scab caused by *Actinomyces* spp. including *A. scabies* [*R.A.M.*, 27, p. 194], under the headings symptomatology, pathogenicity, geographical distribution of the disease and of the organisms, and varietal resistance [cf. 32, p. 692]. The different species associated with the disease are tabulated, with the pathogenicity and geographical distribution of each, and references to the first isolation of the fungus from potato or soil and to the principal study of it. A collection of 11 strains of *Actinomyces* has been obtained from potatoes or from soil and these are being studied at the Milan Institute of Plant Pathology.

Plant diseases—Blackleg of Potatoes in New South Wales. The question of seed transmission.—*Agric. Gaz. N.S.W.*, 63, 10, pp. 534–536, 1 fig., 1952.

R. J. Conroy states that the development of black leg (*Bacterium carotovorum*) [*Erwinia carotovora*: *R.A.M.*, 29, p. 497; 32, p. 501] in New South Wales potato crops is severe only when wet conditions occur during the early stages of growth. In an experiment at Hawkesbury Agricultural College the incidence of black leg on plants from seed tubers derived from healthy or infected plants was the same.

Volcani (Zafrira). **Black leg of Potatoes in Israel.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 222–223, 1 fig., 1953.

Symptoms of potato black leg (*Erwinia atroseptica*) [*R.A.M.*, 33, p. 18] have been recorded in Israel for many years in spring on young plants grown from certified Irish and Scotch 'seed'. In the springs of 1952 and 1953 1 to 2 per cent. infection was found in plots sown from local 'seed' and in the latter year 0·2 to 2 per cent. infection on imported Up to Date and Arran Banner [cf. preceding abstract]. Inoculations of healthy potato plants (by puncturing the stem) [32, p. 642] with a pure culture of a bacterium isolated from affected material gave rise to typical symptoms, the reisolated organism being identical with the original isolates.

Baker (A. D.), Brown (Georgiana L.), & James (Audrey B.). **Relationships of fungi, mites, and the Potato-rot nematode.**—*Science*, 119, 3081, pp. 92–93, 1954.

In work by the Nematode Investigations Section, Entomology Laboratory, Ottawa, Canada, on the potato-rot nematode (*Ditylenchus destructor*), attention was paid to the possible relation of associated organisms, such as bacteria, fungi, mites, and other nematodes. Bacterial wet rots [unspecified] appeared to produce conditions unfavourable to the nematode. Fungal growth was abundant in the broken-down areas which contained large populations of nematodes. In cultures of nematodes and fungi together on potato dextrose agar the nematodes tended to assemble in and round the fungal colonies, frequently feeding on the mycelium. It is apparent that live potato tissue is not essential for the propagation of these nematodes, but transfers to potato agar without the fungal colonies were invariably unsuccessful.

The fungi that *D. destructor* will feed on may include many species. Those already identified at Ottawa include three species of *Fusarium*, *Mucor* (?) *hiemalis*, and *Trichoderma viride*.

Mites were frequently associated with nematode-infested tubers. When the nematodes were cultured on fungal plates the mites (including *Tyrophagus putrescentiae* and *Histiostoma feroniarum*) fed on the fungi, and were capable of damaging a fungal colony very quickly. When the fungus has been largely consumed the nematodes disappear.

Behind the 'feeding front' of the nematodes in the tuber a 'fungus garden' is built up, and the main activity of the nematodes probably consists in building up this garden rather than in direct feeding on living tissue. When it has become well established most of the nematodes are found in this area. There was some indication that fungal colonies may be necessary for the most successful development of these nematodes in the potato.

Baba (I.), Takahashi (Y.), & Iwata (I.). **Studies on the nutrition of the Rice plant with reference to Helminthosporium leaf spot (preliminary report), V** [? **VI**]. **The plant growth and susceptibility to the disease as affected by the addition of iron to culture solution.**—*Proc. Crop Sci. Soc. Japan*, 22, 1–2, pp. 41–42, 1953. [Japanese, with English summary.]

Further experimental work on the nutrition of the rice plant in connexion with *Helminthosporium* [*Ophiobolus miyabeanus*: *R.A.M.*, 32, p. 695] at the National Institute of Agricultural Sciences, Japan, demonstrated that the addition of iron in large amounts to the culture solution caused root rot, while manganese had a favourable effect. The manganese : iron ratio and the percentage content of manganese in the rice plants were reduced by the addition of iron or hydrogen sulphide. A high negative correlation existed between the manganese : iron ratio in the leaf blade and susceptibility to the disease. No high correlation existed between susceptibility and yield but there was one between yield and the silicon : nitrogen ratio of the leaf.

Revilla (V. A.). **El 'quemado' o 'brusone' del Arroz en el Perú.** [The 'blast' or 'brusone' of Rice in Peru.]—*Inf. Estac. agríc. 'La Molina'* 86, 16 pp., 12 figs., 1953. [English summary.]

Samples of rice submitted for examination from the Zaña Valley, Peru, early in April, 1953, were infected by *Piricularia oryzae*, the first record of its occurrence in the country [C.M.I. map No. 51]. On a visit to the affected area the author observed the disease on the widely cultivated B.A.M. 5 (Barampur No. 5) variety, as well as on Minagra (Barampur No. 8), Radin China, and others grown on a smaller scale. Seedlings of B.A.M. 5 were susceptible in inoculation experiments. The reduction in yield due to the pathogen over an area of 200 ha. was estimated at up to 50 per cent. and the quality of the rice was very poor. Other outbreaks were detected later in the season, a severe attack developing, for instance, on nursery plants of the Lambayeque No. 2 and B.A.M. 1 varieties and resulting in a loss of 80 to 100 per cent. of transplants over a month old.

The spread of the disease during June and July may well have been favoured by heavy rains, coupled with abrupt changes of temperature, which rose to over 26° C. by day and fell at night. Control measures should include the eradication of the weed hosts of the fungus, *Panicum barbinode* and *Digitaria sanguinalis*; procurement of seed for new plantings from disease-free localities and its disinfection with an organo-mercurial, e.g., arasan or granosan; a well-balanced scheme of soil amendments; crop rotation; and the use of resistant varieties. In connexion with the final recommendation 20 varieties are undergoing inoculation tests at the Agricultural Experiment Station, La Molina.

Turner (J. N.) & Kennedy (M. E.). **Microflora of Crêpe Rubber.**—*Nature, Lond.*, 173, 4402, p. 506, 1954.

Samples of discoloured crêpe rubber obtained from Ceylon were incubated at 25° C. in moist chambers at the Hawthorndale Laboratories, Jealott's Hill, Bracknell, Berks. The resulting colonies of fungi [*R.A.M.*, 25, p. 354 and next abstract] were subcultured on 2 per cent. malt agar and the pure cultures grown on malt and Czapek-Dox agar and on pieces of sterilized crêpe rubber.

Cladosporium herbarum [27, p. 250], isolated from black discolorations, yielded black cultures and discolorations in inoculated crêpe; *Helminthosporium* sp., *Syncephalastrum* sp., *Penicillium islandicum*, and unidentified black pycnidia obtained from blue-black patches yielded black, grey, red, and black cultures, respectively, and the first three black, grey, and brown discolorations, respectively, on inoculation. *P. chermesinum* from brown patches gave red cultures and brown discolorations; *Margarinomyces luteo viridis* from yellow-brown patches yielded black cultures and discolorations; orange patches yielded *P. citrinum* (yellow, yellow), *P. variabile* (orange, brown-pink), and *Bacillus subtilis*; *P. purpurogenum* from red patches gave red cultures and discolorations. Repeated culturing from green- and violet-stained crêpe produced no growth. The commonest organisms were *Penicillium* spp., particularly *P. variabile*, *P. chermesinum*, and *P. citrinum*.

Shaposhnikov (V. N.), Rabotnova (Mme I. L.), Yarmola (G. A.), & Kuznetsova (Mme V. M.). О развитии плесневых грибов за счет натурального Каучука. [Concerning the development of mould fungi on natural Rubber.]—Микробиология [*Microbiology, Moscow*], 21, 3, pp. 280–282, 1952.

At the Biological-Soil Institute of the Lomonosov Moscow State University, U.S.S.R., the authors isolated *Aspergillus niger*, *A. ochraceus*, *A. fumigatus*, *A. oryzae*, *Penicillium chloroleucon*, *P. chrysogenum*, and *P. notatum* from smoked sheets of natural rubber [see preceding abstract] and obtained vigorous growth with inoculations of other common, widespread moulds. The development of these fungi on natural rubber was found to occur on the organic matter usually present, and the hydrocarbon was not affected.

Park (D.). **Chlamydospores and survival in soil fungi.**—*Nature, Lond.*, 173, 4401, pp. 454–455, 1954.

In the Department of Cryptogamic Botany, University of Manchester, *Botrytis cinerea*, *Mycogone perniciosa*, *Trichoderma viride*, *Trichothecium roseum*, *Fusarium oxysporum* f. *cubense*, and *Stemphylium sarciniforme* grew well in Erikson's inorganic artificial soil solution [*R.A.M.*, 26, p. 511] supplemented by dextrose. However, in glass-distilled water and Seitz-filtered natural soil solution without dextrose growth was inhibited and the cultures were usually non-viable within seven days, except those of *B. cinerea*, *Trichoderma viride*, and *S. sarciniforme* which produced chlamydospores. When the soil solution was enriched with dextrose some inhibition was still apparent and *T. viride* produced chlamydospores. Growth in soil solution autoclaved at 121° C. for 20 minutes was comparable with that in the artificial soil solution; no chlamydospores developed. This suggests the presence of a heat-sensitive toxin in the soil solution. Concentrated spore suspensions of *B. cinerea*, *T. viride*, and *S. sarciniforme* greatly increased chlamydospore formation and growth inhibition in all three fungi. It appears that the chlamydospores are produced in response to adverse conditions, that they contribute to the survival of the fungus, and that this would increase the probability of fungi which produce chlamydospores being isolated from soil.

White (W. L.) & Downing (Mary H.). **Humicola grisea, a soil-inhabiting, cellulolytic Hyphomycete.**—*Mycologia*, 45, 6, pp. 951–963, 2 figs., 1953.

In this second paper of a proposed series [cf. *R.A.M.*, 31, p. 296] dealing with a group of hyphomycetous soil fungi characterized by an abundant production of globose, thick-walled aleuriospores and by their very marked ability to decompose cellulose, the authors describe studies on *Humicola grisea* [loc. cit.] (syn. *Monotospora daleae*). On agar media it produces aleuriospores 12 to 15 μ in diameter. It inhabits cultivated and forest soils, decaying wood, and other coniferous and hardwood forest debris in a wide range of soil types, especially those rich in organic matter. It has been found in widely separated parts of the world, chiefly in parts of North America and Europe which have cold winters. Strains of the species display remarkable stability and uniformity in pure culture.

Bakerspigel (A.) & Miller (J. J.). **Comparison of oxgall, crystal violet, streptomycin, and penicillin as bacterial growth inhibitors in platings of soil fungi.**—*Soil Sci.*, 76, 2, pp. 123–126, 1953.

At McMaster University, Hamilton, Ontario, oxgall at concentrations of 1 in 100 and 1 in 40 compared favourably with crystal violet, dihydrostreptomycin sulphate, and penicillin G in the suppression of bacterial development in soil platings from the rhizospheres of iris, potato, and bean [*Phaseolus vulgaris*], as well as from areas more distant from the roots. Since it also arrests the normally rapid spread of species such as *Rhizopus*, *Trichoderma*, and *Penicillium* [cf. *R.A.M.*, 31, p. 514], oxgall presents obvious advantages as an adjunct in the isolation of slow-growing soil fungi.

Schmidt (E. L.). **Nitrate formation by a soil fungus.**—*Science*, 119, 3084, pp. 187–189, 1954.

Studies at the University of Minnesota, Minneapolis, on *Aspergillus flavus*, isolated from soil in Minnesota, demonstrated that it produced nitrite and nitrate from organic nitrogen sources. This was confirmed with additional isolates of *A. flavus* from several different soils obtained on rose bengal-streptomycin agar.

Stover (R. H.). **The effect of soil moisture on Fusarium species.**—*Canad. J. Bot.*, 31, 5, pp. 693–697, 2 graphs, 1953.

Studies on the role of soil moisture in the growth and survival of six *Fusarium* isolates [cf. *R.A.M.*, 29, p. 413; 33, p. 318] grown in soil in glass tumblers, namely, *F. moniliforme* [*Gibberella fujikuroi*] and *F. graminearum* [*G. zeae*] from maize, *F. oxysporum* f. *cubense* from banana [see above, p. 363], *F. o.* f. [var.] *nicotianae* from tobacco, *F. o.* f. [*F. bulbigenum* var.] *niveum* from watermelon, and *F. solani* from soil, were conducted in the Research Department, United Fruit Company, La Lima, Honduras. All these species and actinomycetes showed optimum growth and survival at 15 per cent. saturation; above 25 per cent. the *Fusarium* populations fell off sharply. The optimum for bacteria was 75 per cent. *Cephalosporium* spp. were remarkably prevalent in the saturated series. It appears that *Fusarium* spp. are strongly aerobic and their populations may be greatly reduced by maintaining the soil in a saturated condition [loc. cit.] in the absence of hosts.

McLachlan (K. D.). **Phosphorus, sulphur, and molybdenum deficiencies on some soils of the Northern Territory.**—*J. Aust. Inst. agric. Sci.*, 19, 3, pp. 197–199, 1 fig., 1953.

In studies at the Division of Plant Industry, Canberra, subterranean clover

(*Trifolium subterraneum*) was grown in pots of four soils from Katherine, Northern Territory, Australia, viz., a grey heavy clay, a red clay loam, a red-brown sandy clay loam developed on Cambrian limestone, and a coarse, grey, sandy, granitic soil. Significant increases in mean yield were obtained with phosphate in all four soils, with sulphur [*R.A.M.*, 33, p. 234] on all except the granitic, and with molybdenum [33, p. 235] on the red and granitic soils. Phosphorus deficiency on the grey, red, and limestone soils was extremely severe.

KHANNA (K. L.) & RAFAY (S. A.). **Annual Report of the scheme for the investigation and control of wilt disease of Sugarcane for the year ending 31st May, 1952.** —9 pp., Central Sugarcane Research Station, Pusa, 1952.

During 1951–2 in Bihar, India, the organisms causing wilt of sugar-cane, *Cephalosporium sacchari* [*R.A.M.*, 31, p. 298 and next abstract] and *Fusarium moniliforme* [*Gibberella fujikuroi*: loc. cit.; 21, p. 161; C.M.I. map No. 102] were found singly and together in ten Co. varieties, four B.O. ones, nine X, and one I.C. variety. They were also found in tissues affected with top rot. *Physalospora tucumanensis* [*R.A.M.*, 31, p. 400] was associated with these fungi in wilted Co. 453 and X 1172. The highest incidence of the disease occurred in the Saran district and parts of Champaran as in the previous season. The variety Co. 453 was surveyed for its behaviour under wilt disease infection, and was found to be susceptible to root inoculation. This variety was grown on a large acreage (89·6 per cent. in the Gate Area of Dehri-on-Sone), thus the area affected by wilt was considerable. In inoculation experiments the percentage wilt infection was increased from 8 to 60 by repeated applications of cultures of *Cephalosporium* and *Fusarium* in alternate months. This fact and the close association of both organisms with wilted tissues supports a previous suggestion (Subramanian & Chona, *Rep. imp. Res. Inst., N. Delhi*, 8, 1938) that the two organisms are states of the same fungus.

The growth of maize and paddy rice seedlings sown in inoculated soil was stimulated by both *Cephalosporium* and *Fusarium*.

The varieties of sugar-cane now grown are not so susceptible to top rot as the older ones, and during the past ten years the disease has not been noticed before the monsoon. In 1951 it was first apparent three weeks after the breaking of the monsoon. *C. sacchari* invades the stem and after causing some internal disorganization the *Fusarium* state appears and hastens cavity formation. *C. sacchari*, *F. moniliforme*, and *G. fujikuroi* all produced typical symptoms of top rot in inoculation experiments.

In exploratory studies results have indicated that the length of the (usually) 3-septate macroconidia is influenced by temperature and the culture medium.

RAFAY (S. A.). **Wilt disease of Cane.**—*Sci. Bull. Sugarcane Res. Sta. Pusa* 2, 30 pp., 1 map, 1952. [Received 1953.]

The history and symptomatology of the wilt disease of sugar-cane in India [see preceding abstract] are outlined, and the detailed results from 1945 given of the effect of wilt on yield, inoculation and varietal susceptibility tests, natural infection, and the organisms concerned. Two fungi were consistently isolated from wilted canes, *Fusarium moniliforme* [*Gibberella fujikuroi*: loc. cit.] and *Cephalosporium sacchari*, considered by some workers to be identical [loc. cit.]. Mixed inoculations of the two caused a marked increase in infection over inoculations with either alone.

BOURNE (B. A.). **Studies on the dissemination of Sugar Cane disease.**—*Sug. J., N. Orleans*, 16, 3, pp. 19, 22, 1953.

Existing regulations for the protection of sugar-cane against the introduction of

new diseases or more virulent strains of established pathogens do not contain any specific prohibition of importation into the United States of certain cultivated and wild grasses, e.g., lemon grass [*Cymbopogon citratus*], known to be frequent carriers of infective agents. Moreover, no provision appears to be made in current plant quarantine regulations for the possibility that such pathogens may enter the country with certain insect parasites and their hosts. For instance, *Fusarium moniliforme* [*Gibberella fujikuroi*: see preceding abstracts] has frequently been found associated with the pupae and adults of the cane borer parasite *Bassus stigmaterus* and the pupae of its host *Diatraea saccharalis*.

Buchanan (W. K.). **Ratoon stunting in Natal. A summary of the present position.** —*S. Afr. Sug. J.*, 37, 8, pp. 499, 501, 503, 1953.

The existence of ratoon stunting disease in commercial plantations of sugar-cane [*R.A.M.*, 33, p. 320] in Natal has been definitely established and work is in progress at the Experiment Station, Mount Edgecombe, on plans for its control and the prevention of further spread. The varieties affected are Co. 301, Co. 281, Co. 331, and (to a very much less extent) N:Co.310. So far there is no evidence of any appreciable reduction in yield due to ratoon stunting, but potentially it is one of the most destructive diseases known to the industry.

Lentz (P. L.). **Modified hyphae of Hymenomycetes.**—*Bot. Rev.*, 20, 3, pp. 135–199, 1954.

After a review of work on the modified hyphal elements of the hymenomycetous basidiocarp during the past 200 years, the author discusses vascular hyphae (including sanguinolentous types and others with coloured contents), pseudocystidia, gloeocystidia (including pileogloeocystidia and vesicular bodies), setae, dichophyses, tramal and hymenial cystidia, cystidioles, basidioles, paraphyses, pseudophyses, acanthophyses, and dendrophyses. There is a glossary and a six-page bibliography.

Thirumalachar (M. J.) & Dickson (J. G.). **Some germination and cultural characters, and cytology of varieties of Ustilago striiformis and the reaction of hosts.**—*Phytopathology*, 43, 9, pp. 527–535, 3 figs., 1 graph, 1953.

Preliminary studies on *Ustilago striiformis* have already been reported [*R.A.M.*, 27, p. 136]. The present contribution from the University of Wisconsin is a summary of investigations on the varieties and races of the smut in artificial culture and on some economically valuable grasses in the United States. On the basis of cultural characters and the results of cross-inoculation experiments the following new varieties of *U. striiformis*, with changes in nomenclature [33, p. 116] and full synonymy, are proposed: var. *agrostidis* n.comb. on *Agrostis alba* and *A. palustris*, var. *dactylidis* n.nom. on *Dactylis glomerata*, var. *hordei* n.comb. on *Elymus*, *Agropyron*, and *Hordeum* spp., var. *phlei* n.comb. on *Phleum pratense*, and var. *poae* n.comb. on *Poa pratensis*, *P. compressa*, and *P. annua*, in place of *U. striiformis* f. *agrostidis* Davis, *U. clintoniana* Davis, *U. striiformis* f. *hordei* G. W. Fischer, f. *phlei* Davis, and f. *poa-pratensis* Davis, respectively.

Savile (D. B. O.). **Notes on boreal Ustilaginales.**—*Canad. J. Bot.*, 31, 5, pp. 663–674, 1953.

This list of smut fungi collected largely in northern Canada and Alaska [cf. *R.A.M.*, 33, p. 183] includes several new records, three new species, one species reduced to synonymy, one new name, and two new combinations. *Ustilago bullata* caused heavy infection on *Hordeum jubatum* [20, p. 536] at Dawson, Yukon, in

July, 1949. *U. utriculosa* may be so abundant on *Polygonum scabrum* in grain fields [in Canada] as to cause the crop to be graded as smutty.

GUYOT (A. L.). **Uredineana. Recueil d'études systématiques et biologiques sur les Uredinées du Globe. Tome IV.** [Uredineana. Collection of systematic and biological studies on the Uredinales of the world. Volume IV.]—*Encycl. mycol.* 24, 602 pp., 11 pl., 70 figs., 2 maps, 1953. Fr. 9,000.

In this symposium of papers by various authors [cf. *R.A.M.*, 31, p. 146] the first (pp. 5–90), by G. B. CUMMINS, is important; it gives descriptions and photographs of the 55 species of *Puccinia* accepted as distinct species on the Andropogoneae of the world. The species are grouped primarily on the uredospore characters of echinulate or verrucose markings, equatorial or scattered pores, and presence or absence of paraphyses. The author thinks it possible that the one report of *P. polysora* on one of the Andropogonoeae (*Erianthus*) may have been based on a misidentification of host. I. JØRSTAD (pp. 91–123) gives an annotated list of the Pucciniastreae (19 spp.) and Melampsoreae (14 spp.) of Norway. G. VIENNOT-BOURGIN (pp. 125–228) gives a third note on the rusts of Africa (second note on those of the Ivory Coast) [32, p. 215]; some of the information has already been noticed from another source [31, p. 633]. *P. polysora* was collected on maize in the Ivory Coast in 1951. *Phakopsora desmium*, often found on *Gossypium barbadense*, developed equally on *G. aridum* introduced to the Ivory Coast. G. DUPIAS (pp. 229–244) gives further lists of the rusts of south and southwest France [32, p. 215]. G. KUHNHOLZ-LORDAT (pp. 249–252) contributes a brief note on two rusts on *Melandrium album*. A. L. GUYOT (pp. 253–256) has notes on two rusts of *Ammophila* and (with M. MASSENOT & J. BULIT, pp. 257–267) makes a comparison of *Puccinia schneideri* on *Thymus* and *P. ruebsaameni* on *Origanum vulgare*. GUYOT & MASSENOT also give (pp. 269–279) notes on three crown rusts of *Festuca* spp. (*P. coronata*, *P. festucae*, and *P. gibberosa*) and (pp. 281–353) the results of tests with heteroecious rusts, particularly those which have uredo and teleuto stages on grasses; a brief account of part of this work has already been noticed [33, p. 22]. Aecidial stages on *Euphorbia* spp. were connected with *Uromyces caryophyllinus* [*U. dianthi*]. A number of other host combinations for heteroecious rusts were determined or verified. A. L. GUYOT (pp. 355–372) also contributes notes on a number of rusts found in Tunisia [26, p. 216]. Finally (pp. 373–602), a bibliographic review is given, including a synopsis of Tranzschel's work [19, p. 167] on the rusts of central Asia, then corrections and additions to Les Urédinées [19, p. 239; 31, p. 146], notes, and indexes.

MORIMOTO (Y.). **Notes on species of the rust fungi collected in the island of Yakushima, Kiusiu.**—*J. Jap. Bot.*, 28, 10, pp. 313–316, 1953. [Japanese, with English summary.]

This is a list of 37 rust fungi collected on the island of Yakushima, south of Kyushu, Japan [*R.A.M.*, 33, p. 261], in June, 1951, including three new species and *Uredinopsis macrosperma* on *Pteridium aquilinum* var. *japonicum*, new to Kyushu.

CUNNINGHAM (G. H.). **Thelephoraceae of New Zealand. Part II. The genus Pellicularia.**—*Trans. roy. Soc. N.Z.*, 81, 3, pp. 321–328, 3 figs., 1953.

A description is given of the genus *Pellicularia* [*R.A.M.*, 22, p. 372], considered the most primitive of the seven genera placed in the tribe Corticieae of the Thelephoraceae, together with notes on its taxonomy and a key to six species found in New Zealand, three of which are new. The author accepts *P. vaga* for *Corticium vagum* and *P. filamentosa* [see above, p. 367] for *C. solani*. *C. praticola* [see above, p. 356] is included as a synonym of the last-named.

Hughes (S. J.). **Some foliicolous Hyphomycetes.**—*Canad. J. Bot.*, 31, 5, pp. 560–576, 16 figs., 1953.

The name *Spilocaea* Fries is taken up: it is based on *S. pomi* (1832) on apple which is conidial *Venturia inaequalis*. *Fusicladium eriobotryae* on loquat is renamed *S. eriobotryae* n.comb. and *Cycloconium oleaginum* on olive *S. oleaginea* n.comb. The name *Fusicladium* is restricted to the conidial state of four species, viz., *V. pirina*, *V. cerasi*, *V. crataegi*, and *F.* (*Cladosporium*) *carpophilum* with denticulate conidiophores. It is based on *F. virescens* on pear, originally described as on apple (probably in error) but is here maintained as conidial *V. pirina*, which is confined to pear. Notes and illustrations are given of three species of *Passalora*. The name *Pollaccia radiosa* is adopted for the 'well-known *Populus* leaf-spotting fungus'. A key is given to the genera *Spilocaea*, *Mastigosporium* [*R.A.M.*, 30, p. 473], *Stigmina* [33, p. 232], *Deightoniella* [32, p. 696], and *Pollaccia*, all characterized by the production of annellated conidiophores in contrast to *Fusicladium*, *Passalora*, *Hadrotrichum*, and *Asperisporium* which have acropleurogenous conidiophores.

Moreau (C.). **Les genres Sordaria et Pleurage. Leurs affinités systématiques.** [The genera *Sordaria* and *Pleurage*. Their systematic relationships.]—*Encycl. mycol.* 25, 330 pp., 79 figs., 1954. Fr. 3.500.

This is part of a thesis submitted in 1950 to the Faculty of Sciences at Paris, and has a preface by R. Heim. *Sordaria* is maintained for four species without appendages to the ascospores; detailed studies of *S. fimicola* are presented. *Pleurage*, with ascospore appendages, includes 16 species studied in culture by the author, and a number of others summarized from the literature, several being transferred from *Sordaria* to *Pleurage*. Notes are given on other genera of the Sordariaceae and on related genera.

This book will be valuable to students of the Ascomycetes. It presents a thorough study, with excellent illustrations, of the morphology, biology, systematics, and other features of the species studied.

Mix (A. J.). **Differentiation of species of Taphrina in culture. Utilization of nitrogen compounds.**—*Mycologia*, 45, 5, pp. 649–670, 1953.

In studies at the Department of Botany, University of Kansas, Lawrence, made to ascertain whether utilization of various compounds of nitrogen might serve as a basis for the differentiation of species of *Taphrina* [*R.A.M.*, 28, p. 548] and between host-forms within a species, 57 host-forms representing 27 species were grown in liquid media.

Ammonium chloride was not used by *T. americana* (from *Betula fontinalis*) or by *T. caerulescens* (from *Quercus macrocarpa* and *Q. prinoides*). *T. nana* (from *B. nana*) and *T. ulmi* (from *Ulmus rubra*) could not utilize ammonium nitrate. Urea and asparagine were used by all the fungi and peptone by all except *T. americana*. No species could use ammonium acetate and all displayed a characteristic pattern of nitrogen utilization. Some host-forms within a species agreed closely in behaviour, though others displayed differences. *T. cerasi* from *Prunus pennsylvanica* differed from *T. cerasi* from *P. avium* in being unable to utilize hydroxy-L-proline and in using β-alanine, glycine (slightly), and DL-leucine. This form was previously assigned [loc. cit.] to *T. cerasi* with some hesitation though it does not differ from it morphologically. No fungus studied required thiamine in the media, though growth was generally improved when it was added. Thirteen asporogenous yeasts also studied were completely or almost completely omnivorous as regards the compounds offered.

It would appear to be possible to differentiate species of *Taphrina* in culture on the basis of nitrogen utilization.

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ERRATUM

Vol. XXXIII, page 150, line 21, delete 'In 1949' and insert 'has' before 'appeared'.